Translation and the Creation of a New Genre:
A Corpus-based Study of Interaction in English and Chinese Popular Science Writings

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ABSTRACT

The aims of this study are to investigate the interactive strategies of the translators in the genre of popular science and the potential influence of translation practice on non-translated popular science writings. The theoretical framework of interaction in written texts and translations is based on work on text-linguistics, pragmatics, discourse analysis, and target-oriented and interactional translation studies. The theoretical framework of the relationship between translations and non-translations draws mainly from polysystem theory and other empirical studies. The investigation is based on corpora comprising texts from *Scientific American* magazine (English and Chinese editions) and *Academia Sinica Balanced Corpus of Modern Chinese*. This corpus-based methodology is adopted to facilitate the observation of recurrent patterns of interactive trends in a large body of texts. Both quantitative and qualitative methods are involved. Whereas quantitative analysis points out trends of interaction based on numerical evidence, qualitative analysis focuses on contextualised factors and seeks to explain the interactive phenomena. The textual findings of interactive patterns are then further supported by paratextual evidence. The study finds that the Chinese translators of popular science writings tend to take an active approach in mediating the gap between source text writers and target readers. The translators use more interactive strategies than the source text writers to involve the readers in the texts. Another important finding is that, based on the use of selected interactive features, we suggest that the Chinese popular science writings have been influenced by the interactive strategies used by the translators, and have begun to show trends of more active writer-reader interaction which are not seen in traditional popular science writings in Taiwan.

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謹以此論文獻給我最敬愛的父母。

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LIST OF ABBREVIATIONS

1PP	first person plural reference
1PS	first person singular reference
2P	second person reference (both singular and plural)
2PP	second person plural reference
2PS	second person singular reference
BT	back translation
CDA	critical discourse analysis
FTA	face-threatening act
LL value	log-likelihood value
SA	*Scientific American* magazine
SA-E	*Scientific American* English corpus
SA-NTC	*Scientific American* non-translated Chinese corpus
SA-TC	*Scientific American* translated Chinese corpus
SC-SCI	science subcorpus of Academia Sinica Balanced Corpus of Modern Chinese
SFG	systemic functional grammar
ST	source text
TT	target text

A NOTE ON BACK TRANSLATION

In the text analysis, each example of Chinese text will be provided with a back translation in English. Since it is impossible to provide an "equivalent" translation, a note on my approach is warranted. The overall approach in this study is to underline the translation shifts and provide a gross translation of the underlined parts as closely as possible - even if it may be grammatically inappropriate in English. The focus of the back translation of the underlined parts is on helping English readers understand the linguistic shifts taking place in the process of translation. The non-underlined parts in the examples will also be back-translated with the purpose of providing information about the co-text of the translation shifts under discussion. In such cases, the back translation, although intended to be as close as possible to the Chinese texts, needs to be comprehensible to the English readers, and therefore grammatical shifts may be made. For example, the tense, aspect, plurality and articles may be made explicit in the back translation; and if necessary, words (such as implicit subjects in Chinese) may be provided in square brackets. However, these changes are made under the condition that they do not interfere with the discussion of the underlined translation shifts.

The transliteration of Chinese proper nouns (of people, institutions, *etc.*) - except those with established English transliterations - follows the convention of Hanyu Pinyin, the most common Standard Mandarin romanization system in use.

CHAPTER ONE
INTRODUCTION

1.1 Initial Observations

In recent years, popular science writing has quickly emerged in Taiwan as being among the bestselling publications, the majority of which are translations, especially from English. Although the publications have received a successful response from the Taiwanese readers, many scientific experts have expressed their concerns about the quality of these translations. Their criticisms are focused almost solely on the accuracy of the translation; for example, works are being translated by translators with limited understanding about the subject. Nevertheless, beyond the concern about the accuracy of translations, little attention is paid to the activity of translation itself and to examine it from the relevant theories, concerning, for example, whether the mismatches between the source and target texts are the result of translation strategy rather than inaccuracy (skopos theory, Nord 1997), or how these translations are influenced by the target readers (audience design, Bell 1984). The popular science publications as an emerging genre also raise questions about the role and influence of translations on the other Chinese popular science writings (polysystem theory, Even-Zohar 1978/2000). We would like to argue that the translation of popular science texts into Chinese has many more interesting dimensions worthy of investigation beyond the question of accuracy, and this is the motivation for carrying out the present study.

The focus of analysis in this research is on writer (translator)-reader interaction because it is the key feature that defines the genre — the writing of science for a lay audience. In the study of English popular science, researchers (e.g. Myers 1989, 1991; Parkinson and Adendorff 2004) have tried to explore how the different linguistic strategies in academic science texts and popular science texts are related to different writer-reader configurations. In this study, the emphasis is not only placed on describing how interaction is realized through linguistic devices, but, more important, explaining why the writers (translators) may adopt certain interactive patterns and how their choices may be influenced by the readers. The social-cultural context in which the genre of popular science lies in Taiwanese society will also be brought into

discussion as a decisive factor to explain the relative status between translations and non-translations.

1.2 Aims and Objectives of the Study

The broad aims of this study are two-fold:

- to investigate evidence of writer/reader interaction in the translation of the genre of popular science from English to Chinese
- to investigate the potential influence of translation practice on non-translated popular science writing as a new genre in Chinese.

The study endeavours to identify the patterns of linguistic features that are used as indicators of interaction between writers and readers. In order to identify the trend of patterns, a corpus-based methodology is chosen so that recurrent patterns can be identified and quantified more clearly in a large quantity of texts. Besides quantitative analyses, qualitative analyses are also conducted based on the frameworks of textlinguistics, pragmatics and discourse analysis. In summary, to attain the aims of this study, the specific objectives that need to be achieved are therefore as follows:

- to construct a theoretical framework and identify a set of textual features which is appropriate for the investigation of writer/reader interaction in this corpus;
- following this theoretical framework, to analyse the corpus both quantitatively and pragmatically in order to identify systematic trends of writer/reader interaction in the texts, based on the co-text and context in which the texts are situated;
- to compare strategies of writer/reader interaction in translated Chinese, non-translated Chinese and a comparable Chinese corpus to explore the potential influence of translation practice on the non-translated Chinese popular science writings.

This study adopts a corpus-based methodology. The popular science corpora under investigation comprise texts collected from the English magazine *Scientific American* and its Chinese edition *Kexueren* published in Taiwan. The texts will first be

quantitatively calculated with assistance of software *ParaConc*, and then recurrent patterns of interactive features identified in the numerical evidence will be further examined manually to investigate the patterns of interactive behaviours of text participants.

1.3 Content and Structure of the Thesis

First, in Chapter 2 we seek to build a theoretical framework within which the investigation of writer-reader interaction and the relative status between translations and non-translations can be conducted. A review of studies on the language of popular science shows that these studies tend to investigate interaction under other topics – ideology, politeness, etc. In this chapter, we use the concept of interaction as the spine and draw from the theories in textlinguistics, pragmatics, discourse analysis and translation studies that are relevant to the investigation of writer and reader interaction. Then, the theoretical framework of the relationship between translations and non-translations draws mainly from polysystem theory and other empirical studies. Finally, the studies of the selected interactive features being investigated in the present study are reviewed.

The questions of data and methodology are discussed in Chapter 3. We start with a review of the application of corpus-based methods in linguistic and translation studies. The advantages and potential danger of conducting a corpus-based study are discussed. Second, we discuss the construction of the corpora of popular science texts for the present study. The process of data selection, compilation and processing are involved. Finally, the analytical model used in the study is presented in detail. Four stages of analysis are involved – word, text, pragmatics and semiotics. Several concepts which are crucial in the process of analysis, including translation shifts, markedness, and the problem of circularity, will also be presented.

The analysis of the parallel corpora is presented in Chapter 4. The first part gives numerical findings of selected interactive features (deixis, personal references, junction, and hedges) in the English and the translated Chinese corpora. The second part contains a contextual analysis based on the trends pointed out in the quantitative analysis, and examines examples (and counter-examples) of the trend identified in the

parallel corpora. The contextual analysis will explore the motivations and effects of the similar or different interactive strategies used by the source text writers and the translators. The chapter ends with a comparison of two case studies from the parallel corpora, which aims to demonstrate how interactive strategies function as a network in a text to achieve collectively its interactive purpose.

In Chapter 5, attention turns to the comparison of interactive strategies among the three Chinese corpora – a translated, a non-translated, and a reference Chinese corpus. The first part presents the quantitative findings of the selected interactive features (with the same features as in Chapter 4), and the second part contains the contextual analyses. The focus in this chapter is to investigate the potential influence of translation practice on non-translations. The different interactive patterns among the three Chinese corpora will be interpreted in relation to the genre of popular science in Taiwan in particular.

Chapter 6 brings together the findings in Chapter 4 and in Chapter 5 in order to present a more comprehensive account of the role of translation – its strategies and its influences in the target society. In order to support and verify the suggested explanations in our textual analyses, we look at evidence from paratexts, including publisher's statements, presentation of the magazine, and data obtained from interviews with the text producers. Finally, the backgrounds of the writers and readers are explored in detail in order to suggest motivations for their interaction in texts.

Chapter 7 concludes with an evaluation of the study and suggestions for further study.

CHAPTER TWO
THEORETICAL FRAMEWORK:
GENRE AND THE AGENCY OF TRANSLATOR

The purpose of this chapter is to review relevant studies in the language of popular science (2.1), the study of interaction in written texts (2.2), the target- and interactive-oriented approach in translation studies (2.3), and the study of the influence of translations on the creation of a new genre (2.4). Based on these models, the present study will construct a theoretical framework that is appropriate for the investigation into writer-reader interaction in the genre of popular science and the changing Chinese popular science writings via the media of translations. Section 2.5 reviews the four linguistic devices that will be used as indicators of interaction in the textual analyses. Section 2.6 is a short conclusion of this chapter.

2.1 The Language of Popular Science

Writing science for the public is not new in human history—"popular science is at least as old as science" (Gregory and Miller 1998:19), but recognizing the writing of popular science as a genre with its conventional linguistic features from a linguistic point of view, however, is a modern subject. Also, the shift from regarding popular science as a process of simplification of knowledge to a negotiation of knowledge between text participants is a new trend.

In Taiwan, with the introduction of more translations of popular science publications, writing science for the public has gradually become a recognized genre. Under the influence of translated popular science books, the boom of this genre started in the 1990s, and the publication of *Kexueren* (科學人, the Chinese edition of *Scientific American*, literally translated as "Scientific People") in 2002 is regarded as a landmark in the writing of popular science in Taiwan.

In this section, we will begin by reviewing some of the studies on the communicative and interactive aspect of popular science in English (2.1.1), and then we will move the focus to the development and studies of Chinese popular science writings in Taiwan (2.1.2).

2.1.1 Studies on the Interactive Dimension of English Popular Science Texts

As society has begun to regard popular science as a pattern of communication with its own features between experts and lay audiences, the linguistic analysts have also started to focus on the communicative and interactive functions of the texts. Researchers draw from different linguistic models to account for the interaction between text participants, such as politeness theory (Myers 1989), metadiscourse (Crismore and Fransworth 1990), and also the textual and discoursal significance (Myers 1991, 1994; Parkinson and Adendorff 2004; House 2006) in the texts. In the following, we will review some of these works that investigate from different perspectives the links between textual features and the writer-reader relationship.

Myers (1989) compares the politeness strategy [1] used by the specialized and popularised science genres. By investigating politeness devices such as pronouns, hedges, passives, questions, jokes, etc., the study finds that in academic science the writers make more use of negative politeness strategy (Brown and Levinson 1987; see 2.2.3) because of the greater power distance between the individual and the science community. By contrast, the writers of popularizations have less tension with public audiences, so the texts have more unhedged claims or personal attributions. This study explains different linguistic patterns in the texts as a response to the politeness strategy adopted by the text producers when managing different writer–reader interaction.

Varttala (1999) also looks at the politeness strategy in popular science by focusing on the use of hedges[2]. Unlike Myers (1989), who investigates popular science as a contrast to academic science, Varttala asserts that the use of hedges in popular science has different motivations to serve its unique communicative purposes and audiences. The significance of this study is to treat the interaction between scientists and lay audiences as the starting point, rather than treating the communication among experts as the unmarked form of interaction.

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[1] Here he follows the model politeness theory of Brown and Levinson (1987). See 2.2.3 for more details of the application of politeness theory in written texts.

[2] An account of the investigation of hedges in this study will also be discussed in 2.5.4.

Different management of interaction can also be shown in the cohesion in the texts. In Myers (1991), interaction is investigated by relating the lexical cohesion to the writer's consideration of the readers' knowledge. For example, in specialized science, cohesion is usually maintained implicitly through lexical cohesion, but in popular science a full range of cohesive devices, such as pronouns, junction, ellipsis, and repetition, is used to assist the readers to process relationships between propositions. The readers rely on cohesive markers to process lexical meanings. This study will be consequently referred to in our analysis, as cohesion is always regarded as an important dialogic strategy used by the writers to signal to the readers[3].

Other studies relate different relationships between writers and readers by comparing the construction of science in academic and popular genres. Myers (1994) looks at the narratives of molecular genetics in journal articles and in popular science reports by examining the presentation of textual organization, syntax and vocabulary. The findings show that in popular science, the discourse tends to foreground the role of scientists and the scientific discovery as an event, whereas in academic science the discourse focuses on abstract concepts and techniques.

Also concerning the ideological view of science reflected in the text, Parkinson and Adendorff (2004) agree with Myers (1994) that popular science places greater emphasis on the role of scientists than academic science does, but further compares popular science with science in textbooks, which are also intended for readers with no scientific knowledge. Their findings suggest that, although both are targeting lay audiences, the writers of popular science treat the readers as in-group members and share knowledge with them, whereas the writers of textbooks present themselves as authorities to provide uncontroversial scientific findings and distance themselves from readers.

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[3] Textual organization and cohesion as a device of interaction are proposed by researchers such as Hoey (1983), see 2.2.3; and the cohesive strategy is particularly relevant to the qualitative analysis of deixis (4.2.1, 5.2.1) and junctives (4.2.3, 5.2.3).

These analyses of science discourse may not seem directly related to the writer-reader interaction in the texts, but they can be a reason for the writer's different strategies to interact with the readers. In other words, how the writer views the construction of science may determine how they want to present science knowledge to their readers. The comparison of textbooks and popular science drawn by Parkinson and Adendorff (2004) provides an important insight into the investigation of popular science writing in this study[4], because our analysis will later show that the traditional science writings for the public in Taiwan resemble many of the features of textbooks, as pointed out in the study of Parkinson and Adendorff.

The interactive function of popular science is also a subject of interest in translation studies, and complicated factors are involved in the process of intercultural communication. Baumgarten *et al.* (2004), for example, focus on the communicative purpose of popular science. Based on data from the German and English editions of the magazine *Scientific American*, they investigate the pragmatic shifts taking place in the translations by focusing on interactive features such as personal deixis, modality, information structure, and word order. The result shows that the interpersonal dimension is less prominent in the German translations than in the English source texts. Baumgarten *et al.* (ibid.) demonstrate that, even in the process of translation, interaction in the popular science texts still plays an important part in the decision-making process of the translators — whether to relay the same interactive function or not[5].

These analyses of the genre of English popular science demonstrate that rich linguistic resources are used in the text for the purpose of interaction, and provide some useful toolkits that can be used to investigate writer-reader interaction, including textual, interpersonal and discoursal dimensions. However, what these studies did not do was to take interaction as the main focus. They focused on different aspects such as politeness, cohesion and ideology, and each of them can be related to interaction in

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[4] A mixture of the two seems to be one of the features characterizing the science writings for the public in Taiwan, as will be shown more clearly in the qualitative analysis of hedges in 5.2.4.

[5] The translation of interaction will be further discussed in 2.3. This project is also important to our analysis of translation as a medium to initiate the creation of a new genre, and this aspect of the project will be further reviewed in 2.4.

one way or another. The present study takes interaction as the most important phenomenon in popular science texts and covers all the relevant issues discussed in this section as possible explanations. In the next section we will look at how Chinese popular science writings are presented in Taiwan.

2.1.2 Development and Studies of Popular Science in Taiwan

Kepu (科普, abbreviation of *Kexue Puji* 科學普及, literally translated as "science popularization") is often regarded as the equivalent of popular science in English. Chinese scholars usually define this term as having three components: accuracy of science, style of literature, and humour (Fang 2004). The criticisms of local popular science writings generally focus on the entertainment factor — that is, Taiwanese popular science writing is not sufficiently interesting to attract readers. Pan (2002) compared writings in Taiwan with those in English, and cast doubt on whether *Kepu* in Taiwan can really be said to be the equivalent of popular science in English.

Translations of popular science, greatly outnumbering texts produced by Taiwanese writers, also draw many criticisms. The present study surveys a range of online reviews about translated popular science books (e.g. Pan 2001, Lin 2000, Hong 2004) and finds that many of them use the word *shense* (深澀), implying both difficulty and distance. It seems that the content may be interesting but the problems lie in the language, which causes the readers difficulty in accessing the textual world.

Even though the boom of *kepu* has lasted in Taiwanese society for more than a decade, judging from the reviews prevailing in the society, there still seems to be a lack of consensus as to what constitutes good popular science writing and even whether the so-called Chinese popular-science writing exists. Hong (2004), along with many others, calls for the cultivation of local Chinese popular science writers, and regards the introduction of the Chinese edition of *Scientific American* as an open window for the Chinese writers, as it includes not only translations from the English edition but also Chinese scientists' writings. The influence and evaluation of this magazine can

be seen from the fact that it has received awards for the best scientific magazine[6] every year since its publication in 2002 (until the latest one in 2006).

In terms of the linguistic or translation studies of popular science, there are only a few academic studies. King's (2003) study sets out to investigate the strategy and principle of the translation of popular science from the point of view of a reader. The study concerns the gap between the source culture and the target culture. This research adopts a prescriptive perspective and concludes five guidelines for the translator of popular science translators (ibid.:22-24): (1) understanding of the readers' background; (2) accuracy of scientific information; (3) consistency in the translation of terminology; (4) naturalness of the language; (5) avoidance of potential obstacles to comprehension to the readers. Although King's study brings consideration of the target readers, it focuses only on the language itself and fails to contextualize the analysis by drawing in the role of text participants and their interaction.

Chen's (2006) study is also based on the translation of popular science texts in Taiwan. The focus of this study is to construct a large-scale Chinese comparable corpus, and to test connective explicitation as a feature in support of the explicitation hypothesis (Blum-Kulka 1986/2000). The study finds that Chinese translated popular science texts tend to use more connectives than non-translated texts. However, there is little concern of the generic features of popular science in Taiwan in this study. As specified in the study (Chen 2006:268), popular science texts are chosen for the study because they provide a contrast to the literary corpora which are more often investigated, they are a genre of growing popularity in the Chinese translation market, and the reference corpus is readily available. It is clear that the study focuses on the statistical and quantitative analysis of the data, rather than exploring the generic features that are located in the texts.

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[6] *JinDingJiang* is an award for the publication industry launched by the Taiwanese government. The number of science magazines registered for the competitions is not available. According to a study of science magazines at 2004 (Fang 2004), at least thirty science magazines were published in Taiwan around the time between 2002-2006. Therefore, it is assumed that *Scientific American* is competing with many other science magazines and the award is a real confirmation of its quality and contribution to society.

To conclude, from a social perspective, it can be seen that the trend of popular science writing is changing, and remains largely under the influence of a comparison of local and English writings. Chinese science writings for the public have been challenged as not being real popular science, and a new canon has been introduced as the model for Chinese writers. Nevertheless, it should be clear that the linguistic study of popular science has not yet described this trend, and has failed to account for the contextual factors that are located in the Chinese popular science texts.

2.1.3 Concluding Remarks

The overall framework of the present study will be derived from the important work on the interactive dimension in English popular science texts discussed above (section 2.1.1). The social and linguistic features of Chinese popular science writings (section 2.1.2), although of limited utility as an analytical model, will be referred to in the course of social-textual analysis of Chinese texts. The model for analyzing interaction will be further complemented by other works of interaction in written texts (2.2) and in translation (2.3).

2.2 Interaction in Written Texts

One of the aims in this thesis is to investigate interaction in written texts. It seems needless to emphasize that a written text involves interaction, since it is written by a writer and read by readers, and therefore the writer, the readers and the text interact. However, when the study of interaction in linguistics began to attract attention, the focus was mostly on spoken texts, in which the interaction of speaker and listener was more obvious. Nevertheless, interaction in written texts has gradually received more attention and different approaches have been proposed. Researchers (Hoey 1983, Nystrand 1986, Myers 1999, Thompson and Thetela 1995, Hyland 2005 and many others) argue that interaction in written texts can be conducted like that in the spoken text, though in different ways as a result of different media.

The definition of interaction in previous studies, however, remains a vague concept. The concept of interaction has been introduced in different linguistic disciplines, but they all seem somewhat different in what they mean. The discussion of "interpersonal" (Halliday 1985), "communicative" (Beaugrande and Dressler 1981),

"dialogic" (Hoey 1983), or "metadiscursive" (Crismore and Fransworth 1990, Hyland 2005) aspects of written texts all seem related to the concept of interaction, but these studies are, however, isolated under different kinds of frameworks and approaches and do not relate to each other.

In the present study, we adopt the theme of "interaction" – which will be defined for the purpose of the present study in 2.2.1 below – as the spine of the theoretical framework, and use this main concept as the needle to interweave all the related studies in different disciplines together into a theoretical model which will enable us to gain a clearer picture of the interactive dimension of our data.

2.2.1 Overview of the Investigation of Interaction in Written Texts

Thompson and Thetela (1995) and Thompson (2001) provide a clear picture of the studies of interaction in written texts. They point out that there are two mainstreams in this field: information-oriented and function-oriented. (The former is also termed *interactive* and the latter *interactional*)[7].

(1) Information-oriented: The core concept here is that dialogue should be regarded as the basis of the construction of monologue, so the written text is considered as a dialogue between writer and reader (e.g. Widdowson 1984; Hoey 1983; and more discussion below in 2.2.3). This is also called a reader-friendly interaction because the focus of the studies is on how the writers care about their readers.

(2) Function-oriented: This approach concentrates on the side of the writers in interaction, and is also called writer-oriented. The theoretical basis can be traced back to the interpersonal function in SFG (Halliday 1985). The studies focus on how the writers use linguistic features to express their attitude and stance overtly in the texts – by the use of questions, comments and evaluations etc., and to influence the readers.

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[7] To avoid confusion, in the present study we keep the term interactive as a general reference to the adjective of all activity of interaction, and use the terms information- and function-oriented to refer to the two specific categories of interaction.

Although the studies of interaction are categorized into two approaches, they are, however, "essentially the two sides of the same coin" (Thompson 2001:61). In a text a writer generally wants to achieve the two interactive goals at the same time, and often a linguistic device is employed to achieve two interactive purposes simultaneously. For example, inserting a question can be regarded as a friendly signal, demonstrating the concerns for the question the readers possibly have in mind, but on the other hand this can be a manipulative strategy to encourage the readers to follow the question and then accept the answers provided. Therefore, the approach of staying on only one side of the interactive dimension may result in an incomplete interpretation of the writer-reader relationship.

For this reason, Thompson and Thetela (1995:125) raise their concerns about the trend that the two aspects of the interaction are often conducted separately: "one area that has not yet been explored is the way in which interactive, reader-friendly choices work together with interactional, reader-managing choices." This is also the basic principle we intend to follow in examining our data: not only how the writers act but also how the readers influence the text. The approach is to bring the two sides of the pictures into consideration and provide a clearer picture of the interaction taking place in our data. Therefore, for the present study, **interaction in texts is defined as the phenomenon of how the writers position themselves in the text and how the readers participate in the process of reading.**

In the following section, an account of the research on interaction in written texts in different disciplines and approaches will be given, and an account provided of how they may be distilled into a model suitable for the present study.

2.2.2 Systemic Functional Grammar

Halliday (1985, 1994 2nd edition), in his SFG, separates the interpersonal (an interactive exchange) and textual function (the construction of texts) of languages alongside the view of ideational function (a representation of experience). When discussing clauses as exchange, he touches upon the issue of interaction: "Simultaneously with its organization as message, the clause is also organized as an **interactive** event involving speaker, or writer and audience" (Halliday 1994:68, my

emphasis). Although the term "interactive" is used here, it is different from the concept of interaction pursued in this study, because the interpersonal function is actually more personal than interactive. This model is the origin of the idea of function-oriented, or writer-oriented, interaction proposed by Thompson and Thetela (1995). The interpersonal function concerns only "the speaker's 'angle': his attitudes and judgements, his encoding of the role relationships in the situation, and his motive in saying anything at all" (Halliday and Hasan 1976:26-27). In the SFG model, the interpersonal function is realized mainly through Mood and Modality[8]. However, modality is not always interactional but only personal because "modal and attitudinal expressions normally convey the speaker's own view of events without directly setting up interactional expectation" (Thompson and Thetela 1995:106). Compared with the definition of interaction adopted in the present study (see 2.2.1), the interpersonal function deals only with how the writers present themselves in the text and not how the readers influence the text.

By focusing on the function of language, SFG, however, has brought the study of languages into a new realm and inspired many more studies later in the field of interaction. Language is no longer a relation between form and meaning, but between meaning and function. It is only when we start to consider the function of language that it becomes sensible to discuss the interaction in texts, since interaction does not reside in the form or meaning of language, but exists between the text participants in the process of using languages.

2.2.3 Textual Organization and Cohesion

If SFG concerns mainly writer's discourse, then the studies of Hoey (1983, 1991, and 2001) can be regarded as concerning reader's discourse. Reviewing Halliday's map of language (1961), Hoey (1991:198) proposes that the term of context used by Halliday is mainly semantics-based and suggests replacing the term context with **interaction.** He uses interaction as a synonym of context, but his concept of context is largely

[8] In SFG, Mood is the constituent formed by Subject, a nominal group, and Finite, part of a verbal group (Halliday 1985:72-73). Modality refers to the expression of the speaker's opinion, through intermediate degrees between the positive and negative poles (ibid.:86).

related to the dialogic nature of written texts. To elaborate this point, we must first summarize how Hoey views the role of reader.

Rather than hold the traditional view of texts as being a product controlled by the writer, Hoey follows the dialogic viewpoint[9] to put more focus on "the reader's approach to a discourse" (ibid.:13). That is, the writer can control what to write in the text but the reader also has the power to select what to read and how to interpret. Reading instructional manuals or dictionaries are all good examples of the reader's power to select the parts they want to read. Therefore, the readers' participation in the process of reading is no less important than the writers' participation in the process of writing. As in the process of speaking, the process of writing also involves a construction of dialogues between the writer and the imagined readers in his mind, and an anticipation of the readers' possible responses. On the reader's side, they also anticipate what the writer would want to tell them in the text. Thus, based on the cultural and linguistic background and what has already been said in the text, the writers expect the readers' reaction and the readers expect the writers' action.

In Hoey's study, this dialogic nature of written texts is especially reflected in the textual organization. He focuses on how sentences are organized in a text by the writer and interpreted by the reader. Some key sentential relationships include sequence relations such as time sequence and cause sequence, signalled by subordinators and sentence conjunctions, and also matching relations such as contrast, similarity, and exemplification, signalled by subordinators, conjunctions, repetition, and parallelism (Hoey 2001:31). The writers use these linguistic devices as signals to tell the readers how to interpret the texts, and if the readers pick up the message, the communication is successful; otherwise, the comprehension may slow down or even break down.

Hoey emphasizes dialogic nature in the text-linguistic analysis, and places more emphasis on the readers' influence on the construction of texts. Written texts are no

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[9] Hoey's dialogic approach can date back to Bakhtin (1973), who first proposes the use of a dialogic approach to examine Dostoevsky's prose. Bakhtin claims that this writing does not reflect the writer's voice alone, but many linguistic features suggest that the passages of monologue can easily be converted into a dialogue.

longer controlled by the writers, but in the analysis of the construction of a written text we cannot neglect the reader's background or attitude because they also influence the writer's decision. Nevertheless, the problem with this model is that the linguistic devices are taken from the starting point of the writer's service to meet the readers' needs. In reality, the writers and the readers are strategic selves and they do not always intend to cooperate with each other, and the communication can often get into trouble. To analyse further the process of interaction, we need to examine interaction theory from a pragmatic point of view.

2.2.4 Pragmatics: Intentionality and Acceptability

An important work on approaching interaction in texts is that of Beaugrande and Dressler (1981). Although they did not use the word "interaction", their studies of texts consider the components of writer, reader, and situation. The most significant contribution is a shift from a text-centred to a user-centred approach, i.e. they open the door for pragmatics.

They approach the interaction within texts – which is defined as "a communicative occurrence" (ibid.:3) – with the following standards of textuality: cohesion, coherence, intentionality, acceptability, informativity, situationality, intertextuality. Cohesion and coherence are concerned with the structure within a text, intentionality and acceptability concerns the attitude of writer and reader towards the text, and the other three are related to the context in which the texts are located. Among the seven standards, their studies of cohesion and coherence provide a useful insight for the data analysis in the present study, especially concerning junction[10], but here we would like to draw more attention to the user-centred aspect of intentionality and acceptability.

The discussion of intentionality and acceptability concerns the role of text producer and text receiver, and is therefore important to our central line of interaction theory. Intentionality can be simply put as "the text producer's attitude that the set of occurrences should constitute a cohesive and coherent text instrumental in fulfilling the producer's intentions" (ibid.:7) In other words, the text producer can decide how

[10] Cohesion and junction in their study will be reviewed in 2.5.3 and applied in the qualitative analysis of junction in 4.2.3 and 5.2.3.

best to use cohesion and coherence in order to reach their communicative goal. On the other side of interaction, acceptability concerns "the text receiver's attitude that the set of occurrences should constitute a cohesive and coherent text having some use or relevance for the receiver" (ibid.:7). Therefore, the text receiver can also decide how to accept a text as being cohesive and coherent, depending on his attitude based on the relevance of the texts to himself. Not only does a text contain features and structures that can be used to signal the writer's attitude or concerns for the readers, but the text participant's attitude is also important in a successful communication.

If Halliday's (1985) study tells us which linguistic features in the texts can be related to the writer's attitude, and Hoey's (1983) studies tell us which textual organization in the texts show the writer's concerns for the readers, then Beaugrande and Dressler's (1981) theory approaches the issue from the other perspective: how the writer chooses to use a particular linguistic feature and how the reader accepts a particular linguistic feature. An important advantage of adopting this viewpoint is that not only can we investigate what is in the texts, but what is not in the texts also becomes meaningful. Here text is regarded as "a document of decision, selection, and combination", and therefore "many occurrences are significant by virtue of the other alternatives which might have occurred instead" (ibid.:35). Following this line we can relate the linguistic features identified in the texts as a choice made by the text producers, and then, following the aspects of intentionality and acceptability, we can relate the choices to the attitudes of the text participants.

2.2.5 Politeness

To understand the intention of the writers and their consideration for the readers in a given social context, the concept of Face is important to the analysis of interaction. Brown and Levinson (1987) draw on Goffman (1967) for the concept of Face, and construct a model of politeness. Although their theory is originally based on conversational data and focuses on face-to-face interaction between speaker and hearer, the application of politeness theory, however, has been extended to the analysis of several genres of written texts (e.g. Cherry 1988, Hagge and Kostelnick 1989, Myers 1989).

Face is "the public self–image that every member wants to claim for himself" (Brown and Levinson 1987:61). In the system of politeness theory, a Model Person carries both a negative face — i.e. the freedom of action and from imposition, and a positive face — i.e. the desire of being appreciated and approved of. Any action that may threaten the other person's positive or negative face is called a Face Threatening Act (FTA). In an interaction it is inevitable that an FTA is always involved, and the interactant as a strategic self always has to calculate between the highest pay-off and the least loss of face. The weight of an FTA, according to the theory, is based on the social distance and the relative distance in power between the interlocutors, and the rank of the imposition. If we follow the line of preserving face as the motivation behind the interaction, then the text analyst can reconstruct a line of reasons behind any individual choice of linguistic features if they have a clear picture of the social relationship between the participants.

Although the politeness theory proposed by Brown and Levinson deals mainly with spoken data, it plays an important part in the present study by bringing the social relationship between writers and readers into an explanation for the interaction. Given that the writers and readers in popular science have great social and power distance (science experts versus lay audiences), it will be significant to observe how the popular science writers use linguistic devices to interact with readers or to modify FTAs.

2.2.6 Genre and Discourse

Genre and discourse may not seem directly related to the theory of interaction, but they provide an important net in which the issues of interaction discussed above can all rest. The starting point of genre and discourse study is:

> the listener/reader, speaker/writer, seen **not** as an isolated individual, but as a social agent, located in a network of social relations, in specific places in a social structure (Kress 1989:5).

When we discuss interaction at a pragmatic level, the text participants seem to interact as strategic selves. However, text producers and receivers actually rely on the social

or institutional norms to carry out a successful interaction. To be more specific, the norms involve generic and discoursal constraints. Here we follow Kress (1989) and Hatim and Mason (1990) for the definition of these two concepts. Genres are defined as conventionalized forms of texts derived from conventionalized forms of the occasions, and they encode the functions, purposes and meanings embodied in those social occasions (Kress 1989:19). Discourse in this study refers to the "attitudinally determined expression" that is characteristic of a social institution (Hatim and Mason 1990:70). The traces of interaction analyzed in the texts are the realizations of the writer's choices that are governed by generic and discoursal constraints. A hierarchical relationship amongst text, discourse and genre is displayed in the following figure:

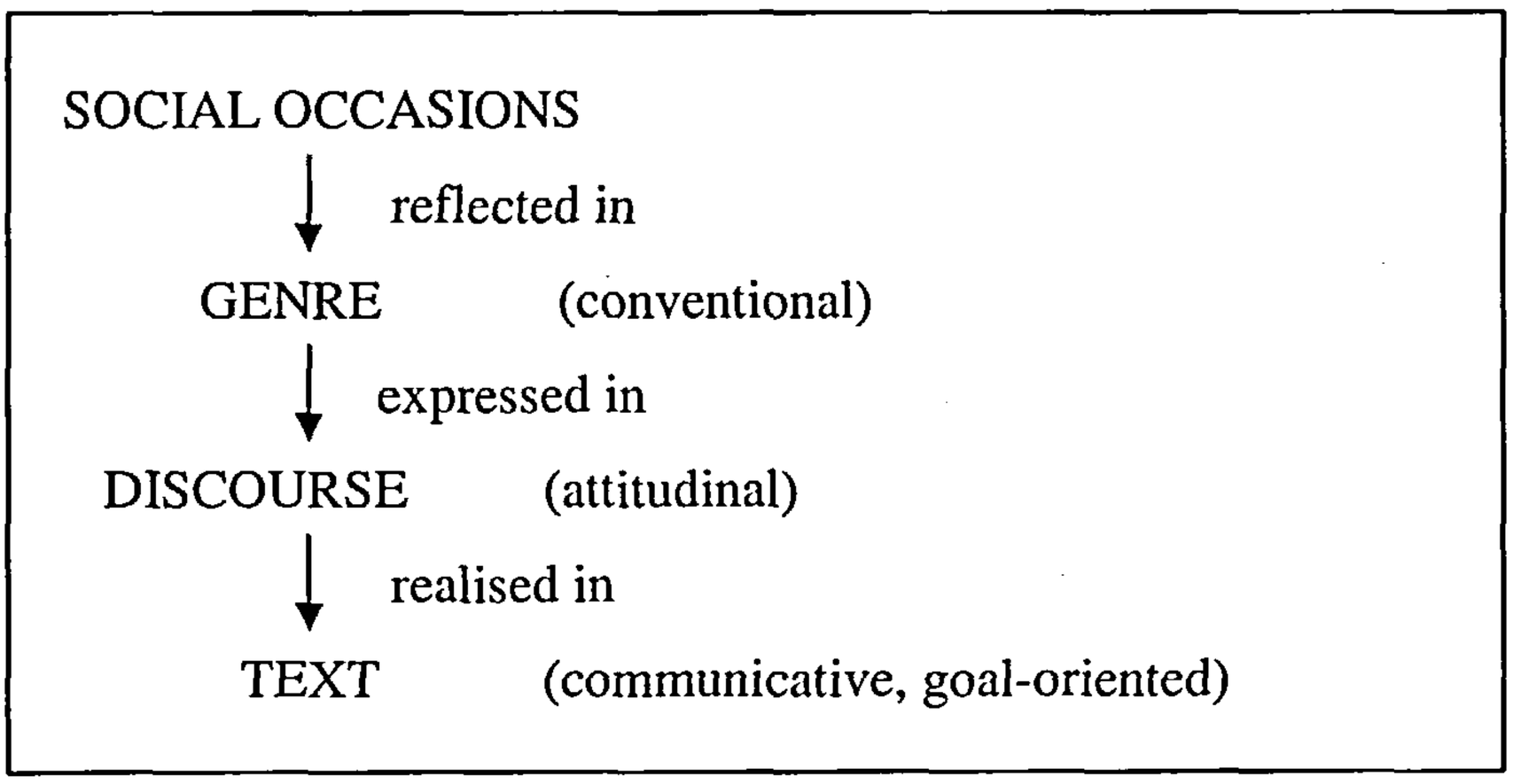

Figure 2.1 Hierarchical relationship between text, discourse and genre (adapted from Hatim and Mason 1990:71, 74)

It is with the awareness of this social mechanism involved in the process of interaction and embodied in the written texts that the text producer and the text receivers can achieve an interaction. If the text participants fail to be aware of the constraints, they fail to interact. The text producers express their intentions by following (or manipulating) the generic and discoursal constraints and send the conventionalised interaction components to the readers through the medium of the text. The text receivers retrieve the interaction components following a reverse direction by reference to the discoursal and generic constraints in which the text and the text participants are located, and then reason the intention of the writers – i.e. they build a "text-world model" (Beaugrande and Dressler 1981:84)

Given that the aim of the present study is not only to describe but also to endeavour to explain the activity of interaction, CDA (e.g. Fowler and Kress 1979, Martin 1985, Fairclough 1989, 1995), among other approaches to discourse, is of particular importance to the theoretical framework. The principle of CDA is that languages not only reflect but also reconstruct ideologies in social institutions, and very often these ideological values have been neutralized in the habits of languages and become unnoticed by the language users. The critical approach adopted by CDA is in contrast to the descriptive approach, which either adopts a non-explanatory approach or provides explanation only within local limits (such as the intentions of a particular text or writer). CDA seems to go beyond the immediate context of the texts and seeks an explanation for cumulative social practices in a macro structure. Although the demystification of political discourse and social objectives, which are often the topics in CDA, have no part to play in the present study, this critical approach will still be an important tool in the analysis of the present study since we seek to explore and explain the significance of popular science in the society and the attitude of text participants.

It should be noticed that CDA, although a powerful explanatory framework, has often been criticized for circularity (by Stubbs 1997, Widdowson 2004). It is argued that CDA analysts often approach texts with a biased perspective; that is, they look for what they want to derive from the texts. The solution proposed for minimizing subjective intervention in the interpretation of the texts includes an ethnographic approach, corpus linguistics, etc. (Stubbs 1997:111). The present study is aware of this problem, and seeks to support our findings and explanations from paratextual evidence. A detailed approach to deal with circularity in the analysis will be discussed in the methodology in section 3.4.

2.2.7 Concluding Remarks

Although the theories reviewed in this section seem to have different approaches and goals – writer- versus reader-oriented, personal versus textual, descriptive versus critical, together they contribute to a study of interaction in written texts. It is obvious that many of the dimensions of interaction reviewed in this section have remained

unexplored by the studies of Chinese popular science writings (see 2.1.2), and therefore it is an important aim of the study to carry out an investigation into different dimensions of interaction in the data.

2.3 Target-oriented and Interactive Translation Studies

The models reviewed in 2.2 can also apply to translations, as one type of texts. For example, translation studies have compared source text and target text based on the models of SFG (House 1997); cohesive strategy (Blum-Kulka 1986/2000, Baker 1992); politeness strategy (Hatim 1998, House 1998); discourse analysis (Hatim and Mason 1990, Mason 1994, Munday 2002), etc. However, the process of translation involves interaction between not only writers and readers but also translators, which makes the analysis more complicated. The target-oriented theory from translation studies needs to be involved in the theoretical framework of the present study. Target-oriented translation studies are involved here to compare the interactive linguistic devices adopted by the source and target writers and to explain their different interactive purposes when facing different audiences. Therefore, the assumption is that the translation has its own purpose, which may or may not be the same as that of the original, and the shifts taking place in the process of translation should be regarded as resulting from the purpose and audiences of translation rather than non-equivalence to the source text, as viewed traditionally.

In this section, we will first review the target-oriented functional approach, including skopos theory, and the audience design that complements the purpose of translation with particular emphasis on the complexity of audiences. Polysystem theory is also an important target-oriented translation theory, but it will be discussed in section 2.4 when the influence of translations on target culture is discussed. Then, in section 2.3.2 we will review the representative studies of discourse analysis of translated texts that follow the target-oriented translation model to carry out the investigation of interaction in parallel texts.

2.3.1 Translation as a Purposeful Activity

Skopos, derived from Greek meaning "purpose", was introduced into translation studies by Vermeer (1989/2000[11]) and then elaborated by Nord (1991, 1997) as a technical term for the purpose of a translation. Skopos theory takes the purpose of a translation as the most important principle in translation activity.

Vermeer sees translation as one particular variety of translation action that is based on a source text[12]. Translation takes place when a commissioner orders a translation with a translation brief, i.e. the information given by the clients regarding the purpose of the target texts, the target addressees, and other details such as time, place, occasion and medium (Nord 1997:30). Translators, as the only bi-cultural experts in this activity, have to decide whether it is possible to produce this translation, or how to do so. They may need to negotiate with the commissioner until the translation brief and the reality reach an agreement, and then take this final agreement as the guiding principle throughout their translation decisions. This guiding principle is referred to as skopos.

Skopos theory moves away from the debate on equivalence in translation (e.g. Jakobson 1959 and Nida 1964) and adopts a functional point of view. It is the purpose of the translation rather than the source text that determines the production of a translation. Unlike the traditional point of view that takes source texts as the yardstick for translation decisions and assessment of translation quality, skopos theory considers source texts only as an "offer of information" (Vermeer 1982, as translated in Nord 1997:31). The source texts provide a point of departure for the translator, but beyond that the translator has to look at the end use of the translation in decision-making.

With regard to skopos, Nord (1997:47) distinguishes between two types of translation process: documentary translation and instrumental translation.

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[11] The paper is an English translation by Andrew Chesterman, and the source text is based on a sketch of some previous work of Vermeer and others.

[12] Translation action without source text is like giving advice on cross-cultural communication as a culture consultant.

- Documentary translation "aims at producing in the target language a kind of *document* of (certain aspects of) a communicative interaction in which a source-culture sender communicates with a source-culture audience via the source text under source-culture conditions" (ibid.:47). The effect of a documentary translation, such as in some literature translation, may make the texts feel exotic or distant from the target audience.
- Instrumental translation intends to produce "in the target language an *instrument* for a new communicative interaction between the source-culture sender and a target-culture audience, using (certain aspects of) the source text as a model" (ibid.:47). In other words, the translator retells the texts which are usually adapted to the target norms and conventions, and the readers are not supposed to be aware of the fact that it is a piece of translation.

In a target-oriented text analysis, we can examine the strategy and process of translation, and relate these to the intended communicative purpose of the translation.

Although it provides a new insight into translation studies, skopos is often criticized for not respecting the role of the source text. Newmark (1990:106), for example, disagrees with "the concentration on the message at the sacrifice of the richness of the meaning and to the detriment of the authority of the source-language text". In other words, the skopos view of seeing a source text as merely an offer of information may run the risk of overlooking some important message contained in the texts. Responding to this accusation, Nord (1997:119-120) explains that skopos theory does not throw the source texts away but stresses simply that "the source text, or more precisely, its linguistic and stylistic features, is no longer regarded as the one and only yardstick for a translation." In fact, in her translation-oriented text analysis model (1991, 1997), Nord includes the source text analysis as one important step that guides the translator to make a decision on translation strategies. Furthermore, Nord (1991) adds the principle of loyalty to skopos theory, which commits the translator to a moral obligation to both the source and the target texts. The translator has a moral obligation to reveal to the target readers any changes made in the target texts. Therefore, it would be a misunderstanding to think that the functional approach does not respect the source texts.

Skopos theory has brought an innovation to the study of translation by replacing the equivalence-based analysis by a purpose-driven analytical model. Equivalence is not the only standard by which one should evaluate a translation. This purpose-driven theory provides a new ground for study that sees translation shifts as being the result of a process of decisions, which is intended to serve the purpose of the translation.

In skopos theory, the target audience plays a decisive role. To investigate further the influence of the target receivers on the translation, audience design must be brought into consideration.

Audience design is derived originally from the discipline of interactional sociolinguistics. Bell (1984) categorizes text receivers into four groups, according to their status as to whether they are known, ratified, or directly addressed by the speakers.

	Known	Ratified	Directly addressed	Influence on the speakers
Addressees	Yes	Yes	Yes	1
Auditors	Yes	Yes	No	2
Overhearers	Yes	No	No	3
Eavesdroppers	No	No	No	4

Table 2.1 Four categories of audiences in the model of audience design (Bell 1984)

Their influence on the text producers varies according to their distance — the more distant they are from the producers, the less influence they have. In spoken interaction, the speakers' utterances respond to the audience at the time, i.e. a responsive audience design. In a remote communication or when applying to a written interaction, the text producers often take an initiative audience design. That is, the text producer anticipates the potential response of the receivers and accordingly adjusts the text production. Bell's (1984) study focuses on oral communication, but Mason (2000) and Serban (2005) apply this notion to written translation and emphasize the role of the "referee group" (based on Bell 1984): "any third-party group (or discourse community) whose attributes, including their speech/writing style, are valued by either the addresser or the addressee or both" (Mason 2000:6). This definition of the referee group corresponds to the discussion of the role of discourse in interaction in

2.2.6: that two parties interact by referring to and inferring from the institutional norms. The notion that translation is under the influence of more than one group and the discoursal value of the referee group can help provide a fuller explanation in the present study.

2.3.2 Interactional Translation Studies

Skopos theory provides a starting point from which the translation has its own purpose, and the translator does not have to follow the form or the function of the source texts. The next step is to build a model of text analysis which will make it possible to describe and explain interaction in the parallel corpus.

The analytical model used in the present study is based mainly on the model advanced by Hatim and Mason (1990, 1997). Their study is based on the assumption that translation is "**a communicative process which takes place within a social context**" (1990:3). They go beyond comparing ST and TT profiles (as in the register analysis of House 1977, 1997; Baker 1992) and take a discourse approach in order to capture further the role of the translator's motivation in the process of translation. In this model, the analysis of the texts proceeds along three dimensions:

- Communicative: user (idiolect, dialect, etc.) and use (field, mode, tenor)
- Pragmatic: intentionality (speech acts, implicatures, presuppositions, text act, etc.)
- Semiotic: discourse, genre, and text

Among the three, the semiotic value is especially important in accounting for the translator's motivation. In the review of linguistic studies in 2.2.6, we mentioned that discourse and genre analysis provide a framework to explain the entire individual interaction taking place. Similarly, Hatim and Mason (1990:12) suggest that "the translator's motivations are inextricably bound up with the **socio-cultural context** in which the act of translating takes place."

In order to capture the socio-cultural context, a socio-textual analysis is important. At the semiotic level, the analysts take linguistic expressions as signs. For example, "of course" is regarded as a typical sign in an English counter-argumentation, but in other socio-cultural contexts it may not have this significance. An important task in

translation is to identify the signs in the source text, and then seek to relay the overall contextual effects that are collectively supported by the sign, instead of looking for the equivalent of a sign. Overall, the assessment of translation is based on whether the target readers can read off the attitudinal stance and rhetorical purposes of the text[13].

The socio-textual approach adopted by Hatim and Mason follows the target-oriented translation approach to bring the purpose of translations and the norms of target culture into consideration, and, based on a discourse approach (as discussed in section 2.2.6), to seek explanations of micro-level linguistic devices from macro-level social and institutional constraints.

Munday (2002) is another scholar who pursues an explanation for the translation shifts taking place. Munday's study is based primarily on the descriptive translation studies (DTS) of Toury, but, detecting a lack of specific and systematic steps in DTS, Munday proposes to bring the SFG of Halliday (1985) and the socio-textual practices of Hatim and Mason (1990) into his modified DTS model. Munday's analysis also considers how source texts as well as target texts are both located and accepted in the source culture, instead of the more target-oriented approach taken by Toury. The model is designed to be replicable and testable on any texts and language pairs, so that a more comprehensive picture of translation phenomena can be built up through cumulative results.

The model is operated by first comparing ST and TT in terms of their role and reception in their own cultural systems. In this step, Munday suggests that the reception of texts can be observed through their sociocultural context by methods such as interviews, looking closely at the reactions in media, and also evidence from illustrations and presentations of the texts. Then, the two textual profiles are compared to identify the translation shifts that have occurred. In this step, corpus linguistic tools are used to enable rapid manipulation. It is suggested that the analysts focus on the relative markedness of linguistic features in their metafunctions — ideational,

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[13] Notice that this view is not entirely compatible with a skopos approach. Skopos theory evaluates a translation from a translator-oriented view, i.e. how the translator achieves the purpose of the translation. Here, the socio-textual approach adopts an interactional viewpoint, and it is concerned with whether the end users of the texts can read off the intended rhetorical purposes.

interpersonal, and textual meanings, instead of merely listing their lexicogrammar relations. After substantial translation shifts have been identified in the corpus, the analysts should try to look for possible motivations for the translation shifts, and the explanations have to be referred to as the socio-cultural and political context in which the texts are located.

These steps are operated repeatedly through a large corpus in order to produce a norm that stands for systematic patterns of shifts. The norm is then interpreted in association with the larger socio-cultural context, including the discoursal value in a social institution, or the generic conventions within the social occasions to which the texts belong. This model aims to specify what should be looked for in a comparison of ST and TT pairs and how the norms identified should be related to their social context.

Despite the clear framework proposed in this model, there remain some problems when applying it directly to the present study. First, Munday experiments with only a pair of texts in his case study, but closely examining the metafunctional profiles in a large corpus would be more complicated. Second, in the case study, the final step (to offer possible motivation) is basically presented as all the possible motivations occurring to analysts rather than demonstrating a model. How to offer valid explanations based on sociocultural evidence is not clearly specified in this case study. More important, even though it is suggested that the texts be located in a socio-cultural context, in the case study the only contextual factors discussed are immediate paratexts surrounding the texts (such as illustrations and layouts). This is different from the wider socio-culture, and it may be the historical-cultural context that the present study needs to investigate. Nevertheless, the three steps proposed for investigation and the integration of corpus linguistics in the analysis remain a useful model for the present study..

2.3.3 Concluding Remarks

The present study will investigate interaction in translation based on skopos theory and audience design (section 2.3.1), since the translator's strategy in responding to the end use and users is a key objective; and the process of textual analysis in translated texts will draw from the studies noted above in 2.3.2.

2.4 Translation and the Creation of a New Genre

In addition to the comparison of the interactive strategy adopted by the source writers and the target writers, another objective of the present study is to investigate whether the pattern of using interactive linguistic features in the translation practice has any potential influence on the non-translator's writings. A further question would be whether there are systematic patterns of these features that can be identified in the corpora and may be regarded as evidence of the emergence of a new genre. In this section we will first review a theoretical model that is particularly relevant to the relationship between the translations and the other writing systems in the target culture, and then we will examine the studies of some of the linguistic analysts who endeavour to illustrate this phenomenon by examining evidence from texts.

2.4.1 Polysystem Theory

Like skopos theory (Vermeer 1989/2000, Nord 1997), polysystem theory also takes a target-oriented perspective. However, instead of focusing on the purpose of one translation, polysystem theory tries to place the decisions and strategies made by a translator within a broader historical-cultural context.

Even-Zohar (1978/2000) first proposed the theory of polysystems based on the study of literature as a hierarchy of systems which interact with each other in a dynamic and ongoing evolution and compete for the dominant position in the hierarchy. This model covers all kinds of literature, from high to low, and does not take their status for granted. The contribution of this model is the involvement of translated literature into the system, regarding it as being equally competitive with the other forms of literature and enjoying the same potential to occupy the central position, as against the traditional view of translation as second-rate writing. There are generally three occasions in which the translated system has the opportunity to occupy the leading position: when the target system is young, weak or unstable. When translation moves to the dominant position, it will start exerting its influence on shaping a new literary canon by bringing a new literary repertoire from other languages and cultures[14].

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[14] In historical and cultural translation studies, the situations when translations introduce new forms into the target culture have been widely discussed. Berman (1992:13), in his examination of translation

The original model of Even-Zohar (1978/2000) is based on literary translation, and even though the present study is based on non-literary texts we find the model is equally applicable to the analysis. If the literature system is a hierarchy of systems, then it may be equally applicable to regard science writing as a system of systems, within which are contained different systems such as academic science writing, science news reports, science textbooks and also translated science texts. As a system, it is also part of a system of systems (or polysystem). It may be observed from the review of popular science writing in 2.1.2 that popular science is a young system in Taiwan, and it seems that the translated texts tend to occupy the central position. In this sense, we find the model of the polysystem particularly helpful in our analysis.

By applying polysystem theory to the analysis of the present study, we are able to draw into the discussion the socio-historical role of popular science in Taiwan, such as the fact that popular science has a relatively young history in Taiwan, the general view of the status of translated popular science and its influence, etc. Another contribution of the theory is that it reverses traditional thought on translation: instead of looking at how the translation is restricted by the target conventions, we can study how the translation exerts influence over the target norms. These considerations of contextual factors will shed more light on the present study when we analyse decisions made by the translators, and, more important, the relationship between the translated and non-translated popular science texts in our corpus.

However, actually to apply the model in textual analysis is problematic. One of the common criticisms (e.g. Hermans 1999:110; Gentzler 2001:120) of polysystem theory is that it is established in an abstract level of repertories instead of deriving from many empirical studies, and therefore the theory provides no indication as to how to testify and apply the model to actual texts. In the next section, we will look at some studies of the linguistic aspect of the influence of translations in the target culture.

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theories of the German Romantics in the European context, states that translation "plays a decisive role, largely because it is the transmission of forms." It is the translations that enrich the German culture and language and shape its identity. Bassnett and Lefevere (1990:ix), looking back on the western tradition of translation, claim that "the history of translation is the history also of literary innovation, of the shaping power of one culture upon another." Clearly, this "transmission of forms" is taking place not just in the space of European literature.

2.4.2 Textual Analysis of Translation Influence on Non-Translations

The linguistic study of the influence of translation on the non-translations in the target culture (e.g. Anderman and Rogers 2005, Fan 2006) tends to focus on a micro-level such as lexical borrowings or syntax loan, but investigating the shape of a new genre based on empirical studies of texts is rare.

One of the most comprehensive studies in this respect is a project carried out at Hamburg University's Research Centre "Multilingualism" (see Baumgarten *et al.* 2004, House 2002, 2006). The aim of the project goes beyond the focus of lexical patterns or micro-level text structures, but is rather to investigate the influence of English as a *lingua franca* on the shifts of textual norms and language conventions in other European languages, German in particular.

The corpora of their study comprise a parallel corpus (English source and German translations) and a comparable corpus (German translations and non-translations). The non-translations are used as a comparison to see whether the translations have converged to the source text conventions or whether the translators still operate a "cultural filter" — "a construct with which those 'pragmatic shifts', i.e. those changes in textual norms and conventionalizations that become necessary as the textual material travels through time and space can be conceptualised, described and explained" (House 2002:199). The genres investigated in the study are popular science, economic and computer texts, which are regarded as being the most marked areas in global communication.

The analytical framework of House's project is based on Halliday's (1985) SFG (see section 2.2.2) but treats textual function as a realization of ideational and interpersonal functions. The results show that translation shifts in this genre occur mostly in interpersonal dimensions, especially in the shift from orientation towards addressees in English to orientation towards content in German. The finding again confirms our discussion in 2.1.1: that interaction seems to be the most important component either for writers or for translators of popular science texts. The project contains a particularly interesting diachronic analysis, and shows how translation strategies have

evolved over time. House's study (2006) finds that the use of addressee-oriented markers, including speaker-hearer deixis, mental processes, connectivity, etc., increased significantly in both German translations and non-translations produced between 1999 and 2002, compared with those produced between 1978 and 1982. The findings show that language conventions and norms are in the process of change in German, and the changes are reflected in both translations and non-translations.

This project is of value to the present study in that it provides a model.of how to carry out a macro-level investigation of generic norms in large corpora, particularly with the focus on pragmatic shifts and how the writer treats the readers. However, problems exist when applying the model to the present study. First, in House's study, the non-translations are used as a checklist to see whether the translations are still restricted by the target language conventions; whereas the approach of the present study, following the more target-oriented approach adopted in their polysystem theory (2.4.1), takes the translations as the starting point and investigates their potential influence over the non-translations. Second, House's project focuses on comparing and describing the textual profiles and exploring the influence of English as a *lingua franca* on several European languages, but ignores other contextual factors, such as the publisher's intention or the communicative purposes. In the present study, we would like to investigate the linguistic shifts as a top-down process. That is, the shifts in texts may reflect and be explained by a higher-level purpose[15], such as the shifts in the writer-reader interaction in this social setting. Therefore, observation at linguistic levels is not limited to the influence of one linguistic convention over another, but incorporates the influence of one set of discourse values and generic conventions over the other.

2.4.3 Concluding Remarks

Given that the second aim[16] of the present study is to investigate the potential influence of translations over non-translations, polysystem theory (section 2.4.1) is of great importance because it provides a theoretical ground for the view that translations may have the power to reshape target language conventions and norms. On the other

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[15] See the discussion of how discourse and genre can provide a explanation for pragmatic choices of interactive strategies in section 2.2.6.
[16] As stated in section 1.1.2.

hand, the project discussed in section 2.4.2 shows a practical model, despite having a different ultimate goal from the present study, which shows how changes in textual norms, especially in the interactive perspective, can be carried out in a systematic way.

2.5 Selected Interactive Features

The general framework that enables us to investigate interaction in texts and in translations and to identify potential influence of translation practice on the non-translations having been reviewed, the last section in this chapter sets out to review specific linguistic devices that enable us to carry out textual analyses of interaction in practice.

To select linguistic features that are suitable for the present study, we drew up a list of features that are frequently investigated in interaction-related studies (such as those reviewed in 2.1, 2.2 and 2.3). Based on this list, we studied a pair of parallel texts closely to decide which features are more often shifted in the process of translation – so they have more implications for the text producers' different choices of interactive strategies[17]. In this study it is suggested that a number of linguistic devices are used more often by the text producers as interactive strategies. The four main linguistic devices that will be used as indicators of interaction in texts for the present study are **deixis**, **personal reference**, **junction**, and **hedges**. In the following sections, we will review how they have been explored with relation to the study of interaction in written texts and in translations, and how they are similar or different in Chinese and in English.

2.5.1 Deixis

Deixis, in its simplest definition, is pointing via language. Huang (2007:132) defines deixis as "the phenomenon whereby features of context of utterance or speech event are encoded by lexical and/or grammatical means in a language." Deixis has long been a core issue in pragmatic studies for the reason that Levinson (1983:54) neatly puts as "the single most obvious way in which the relationship between language and context is reflected in the structure of languages themselves…." Through the system of deictic expressions, an orientation of the time, space and personal participants in

[17] Section 3.3.1 will discuss more about the issue of methodology.

relation to the utterance context can be presented. The main categories that are often discussed in the studies of deixis are person, place and time. From a textual and social perspective, Levinson (ibid.) added two more categories: discourse and social deixis.

Person deixis indicates the role of participants in the context of utterance. Typical deictics (or deictic expressions) are personal pronouns, titles or proper names, and vocatives. The system of pronouns basically follows a three-way distinction. First person pronouns are the grammaticalization of the speaker's reference to himself/herself. Second person pronouns are the grammaticalization of the speaker's reference to addressee(s). Third person pronouns encode the speaker's reference to participants other than himself/herself and the addressee(s).

Place deixis points to the spatial location with respect to where the utterance is situated. Place deixis is typically realized through verbs of motion (e.g. *come* and *go*), demonstratives (*this*, *that*) and place adverbs (*here*, *there*). Some languages (including English and Chinese) use a two-term set to distinguish the relative proximity to the text producer's location: close to the producer (proximals) or away from the producer (distals). Other languages make a more elaborated distinction — for example, Japanese demonstratives denote proximity to the producer (*kore*), proximity to the receiver (*sore*), and remoteness from both (*are*) (Huang 2007:154).

Time deixis concerns the encoding of temporal point or duration in relation to the moment at which the utterance is produced. Typical exemplars are demonstratives, time adverbs (*then*, *now*) and tense systems[18]. Time deixis is similar to place deixis in making a proximal-distal distinction between an event that takes place far from or close to the moment of utterance.

Discourse deixis is the encoding of different portions in a text in relation to where the utterance is located. Time and place deictics are often reused here. For example, the

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[18] Tense can be further divided into metalinguistic tense (M-tense) and linguistic tense (L-tense) (Lyons 1977:682; Levinson 1983:77). M-tense can be realized lexically through time adverbs or other equivalent expressions. L-tense is generally formed through the inflection of verb forms. M-tense is common in most languages but L-tense does not exist in some languages, including Chinese. The lack of L-tense devices may influence the translator's strategies in making M-tense devices explicitly.

demonstrative *that* can refer to a portion of discourse in the preceding text, or *this* can refer to a forthcoming chunk of discourse. Levinson draws a distinction between discourse and anaphora deixis in that the former refers to a chunk of discourse whereas the latter refers to the same entity as its prior linguistic expressions[19]. However, Levinson (1983:86) points out that although we can make the distinction in principle, in actual use the anaphoric and deictic are not mutually exclusive.

Social deixis concerns the relative social distinction between participants in the context of utterance. It is often realized through the selection of polite pronouns and titles of address. Furthermore, it is therefore very closely associated to personal deixis. Similar to the distinction between *tu* and *vous* in French, Chinese makes selection between an honorific second person pronoun *nin* or a standard *ni* to reflect the relative social status between the speaker and the addressee. Other examples of social deixis are the choices between formal and standard demonstratives. Alongside the modern set of demonstratives *zhe* (proximal) and *na* (distal), several of the demonstratives used in ancient Chinese, such as 此 *ci* and 斯 *si* (proximal) and 該 *gai* (distal), are sometimes used. The choice of an antique demonstrative expresses a formal tenor and can be motivated by the power relationship between the text participants.

To justify our inclusion of deixis as an indicator of writer-reader interaction, we cannot ignore the vital role of interaction in the use of deixis by text producers and receivers. Selection is not purely based on — and in non face-to-face communication probably even less related to — the three dimensions of time, place and personal participants. From a pragmatic point of view, deixis can be defined as "the structuring of a *relationship* between writer and reader, a dynamic relationship between the multiple selves of each participant in the discourse" (Richardson 1998:131). Therefore we could say that the writer uses deictics to designate relative positions of text participants and the reader uses deictics to find out their relative position to the writer and the texts.

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[19] An example of anaphora is "Harry's a sweetheart; *he*'s so considerate" (Levinson 1983: 86). In this example *he* is an anaphora referring to the same entity *Harry*. An example of discourse deixis is "*That* was the funniest story I've ever heard" (ibid.: 85). Here *that* does not pick out the same referent as a specific linguistic expression referred to in previous segments of texts, but refers to a chunk of discourse.

Psychological distance (Yule 1996:13) is an important concept to explain the writer's use of deixis when the choice is regarded as being contradictory to the actual situation. Usually the physical distance influences psychological distance, so an event that happened a long time ago makes us feel psychologically distant. However, very often a writer may want to manipulate this relationship between physical and psychological distance. For example, when a person smells a bad perfume close to her, she may say, "I don't like *that*" (ibid.:13). In this case, *that*, a deictic choice in contradiction with physical distance, can highlight the psychological distance that the writer tries to convey.

This concept of how the writer chooses to present the psychological distance, rather than reflect an objective physical distance, is even more saliently realized in written communication, because the writer and reader are not normally situated in the same spatial-temporal coordinates and the writers may not even know where their readers are. In translation, the transformation of deictic centre is even more complicated, because not only the time and place have undergone shifts but the participants involved are also different. For example, when translating an expression like *in our country* in a Chinese source text, two possible choices are available: rendering it as *in our country* in the target language as if the translator is still talking to the source text readers; or reproducing it as *China* as if creating a new dialogue with the target text readers. In such cases, how the translator deals with the deictic shifts is not determined by the actual shifts of physical space but by the purpose of translation — the pragmatic effects and how the translator designs to engage with target readers. By observing the strategy towards deixis, studying shifts in translation can help us find out how and why the translator manages interaction.

In the analysis of deixis, we will focus on demonstrative pronouns and adjectives and time and place adverbs, which mainly function as time, place and discourse deixis. Personal references — related to person and social deixis — will be included in another section of personal reference. The quantitative analysis will focus more specifically on the contrast between the proximal and distal demonstratives and

adverbs in English and Chinese, for they indicate a pattern on the writer's projection of distance from the readers.

Table 2.2 summarizes the main time and place deictics in English and in Chinese.

Deictics	English	Chinese
Demonstrative pronouns	this/that these/those	這 zhe/那 na
Demonstrative adjectives	same as pronouns	same as pronouns
Spatial adverbs	Here/there	這裡 zheli/那裡 nali
Temporal adverbs	Now/then	這時 zheshi/那時 nashi

Table 2.2 Time and place deictics in English and Chinese

The table shows that both English and Chinese follow the two-term set distinctions based on the centre of the speaker, near to the speaker (proximal) and away from the speaker (distal). The Chinese deictics are mostly formed by the stems *zhe* and *na*. The spatial adverbs are *zhe/na* plus the morpheme *li* (meaning direction), and the temporal adverbs are *zhe/na* plus the morpheme *shi* (meaning time). In written communication, a variety of more formal synonyms of zhe/na such as *ci/gai* can sometimes appear in particular collocations.

The grammaticalization of deictics in English and Chinese does not vary greatly, but the conventional or preferred use of these deictics seems to involve some differences. At least three points have been discussed in contrastive studies of the use of English and Chinese deixis: (1) Statistics on demonstrative pronouns suggest that in English *this* has lower frequency than *that*, but in Chinese *zhe* has higher frequency than *na*. (2) In endophoric reference, English tends to use *that* to refer to a preceding portion of the text while Chinese prefers to use *zhe*. (3) The selection of Chinese deixis is more strongly governed by psychological distance than English[20] (Zhu *et al.* 2001:31-34).

[20] Zhu *et al.* (ibid.) do not offer a clear explanation for this point, but they refer to Xu (1987). Xu's explanation is based on Qian's (1983) model that English distinguishes between past (that)/ present (this)/ future (this) whereas Chinese further distinguished between near past and near future. In Chinese, proximal is used for present, near past and near future and distal is used for non-near past and future. Xu (1987:143) pointed out that there is no clear line between near and non-near, and he proposed that the distinction is based mainly on the text producer's psychological distance. This is why Xu (ibid.) and Zhu *et al.* (2003) consider that psychological distance plays a more important role in Chinese than in English.

Though these comparisons may have some implications for our analysis, they are far from conclusive. First, the samples being investigated by Zhu *et al.* (2001) and Xu (1992) are restricted to only a small amount of texts, mostly literary works. The differences may result from different generic conventions rather than persistent differences in the languages. Second, most of the comparative data result from parallel texts — English and their Chinese translations or Chinese and their English translations. Therefore, the differences may not be accounted for solely by linguistic differences, but are also related to the purpose of translation.

Concerning the three points raised by Zhu *et al.* (2001) above, we would say that the first two points have relevance for the present study. Translation shifts from distal to proximal may be regarded as preferred shifts[21] especially in the anaphoric use of demonstratives. But the third point is too vague to be defined as a Chinese norm, so we suggest that a shift with regard to psychological distance should still be considered as an optional shift related to the translator's decision. Overall, none of the three contrastive points should be taken as a rule that the translator must follow and make obligatory shifts.

2.5.2 Personal Reference

Personal reference is "reference by means of function in the speech situation, through the category of PERSON" (Halliday and Hasan 1976:37). The category of person includes personal pronouns and possessive pronouns and adjectives. In this study we focus mainly on first and second person references because they are revelations of "writer" and "reader" roles respectively, also referred to as "interpersonal pronouns" (Wales 1996:50). The first and second personal references are distinguished from the third personal reference in that their primary function is considered to be exophoric and deictic rather than being a substitution of a noun in texts. By investigating the selected pronouns, we intend to investigate relationships of text participants in the interaction.

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[21] See the discussion of the three types of translation shifts in 3.3.4.

Table 2.3 and 2.4 show the systems of English and Chinese personal reference.

	Personal pronoun		Possessives	
	subjective case	objective case	determiner function	nominal function
1PS	I	me	my	mine
1PP	we	us	our	ours
2PS	you		your	yours
2PP	Same as 2PS			

Table 2.3 English first and second personal reference

In English, the first person singular (1PS) reference represents the speaker only. The first person plural (1PP) reference may represent the speaker only or the speaker(s) and other persons. The 1PP that is inclusive of addressees is referred to as "inclusive *we*" and the 1PP exclusive of addressees is termed as "exclusive *we*". The second person reference does not make a distinction in its form between singular (2PS) and plural (2PP) reference, and stands for addressee(s) with/without other person(s).

	Personal pronoun		Possessives
1PS	我 wo		[+]的 de (possessive suffix)
1PP	我們 women[22]		
2PS	neutral	Polite	
	你 ni[23]	您 nin	
2PP	你們 nimen	您們(?)[24] ninmen	

Table 2.4 Chinese first and second personal references

[22] Some Chinese grammar guides also make a distinction between 我們 *women* and 咱們 *zanmen*: the former is exclusive whereas the latter is inclusive. But as Yip and Rimmington (2004:47) point out, this distinction is often not made in Mandarin spoken in southern China. The Chinese corpora investigated in this study are Mandarin used in Taiwan where *zanmen* is almost never used (no such instance is identified in our corpus). Therefore, in our corpus, the function of *women* is very similar to the English *we*, which can be either inclusive or exclusive.

[23] In written form the second person pronoun can also have a feminine form 妳. But there is no instance of a feminine form in the translated corpus and only two in the non-translated corpus. Therefore we do not go into discussion of the function of the feminine second person pronoun and calculate the two instances of feminine pronoun in SA-NTC as being neutral in form.

[24] According to Lü (2005: 418), *ninmen* may exist in the written mode but does not exist in the spoken mode. There is no instance of *ninmen* in our Chinese corpora. Yip and Rimmington (2004:47) indicate that the plural form of polite second personal references is often conveyed by a combination of a neutral form and other supplementary phrases, such as 你們兩位 *nimen liangwei*, meaning *you two* (*honourable sirs*).

The two tables display some differences of Chinese and English personal references. First, Chinese does not make a distinction in case. A personal pronoun can be either subject or object[25]. Secondly, Chinese pronouns add a suffix *+men* to indicate their plurality, and the second personal pronoun also has a differentiated plural form. Thirdly, a polite alternative *nin* is available for second personal reference. The choice between neutral and polite form depends on the relationship of power and solidarity between the writer and the addressee. *Nin* is commonly used to address superiors or new acquaintances (Yip and Rimmington 2004:47), emphasizing distance in a social hierarchy between the speaker and the addressee. Finally, in Chinese the possessives of determiner and pronominal functions share the same form, both by adding a suffix *de* to the personal pronouns. Despite these minor differences, the systems of personal reference in both languages are very similar and there seem to be only rare occasions when the translator has to make obligatory shifts.

First and second person references are important in our studies because their frequency of occurrence can be regarded as quantitative indicators of the explicit presence of writers and the readers (Hyland 2005:53). Fowler and Kress (1979:201, 203) remind us that every utterance has an explicit or implicit source *I* or *we* and also an explicit or implicit addressee *you*. The writer needs not mention the source and the addressee in every utterance; in fact, impersonalization is the preferred structure in many genres. The level of explicitness of the presence of first and second person references therefore indicates the writers' intention for stronger involvement in the text. In the study of the English popular science genre, for example, the presence of *you* is a unique feature distinguishing it from other science genres and showing a stronger interactive dimension (Hyland 2005:100). These occurrences of *you* can be considered as indicators of "the speaker's consciousness of, care for, or, most often, desire to manipulate, the addressee" (Fowler and Kress 1979:203). Consequently, the different frequencies of first and second person references between popular science

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[25] Notice that the subject pronouns are not compulsory in Chinese as they are in English. The subject can be left unspecified if it is considered by the text producer to be understood from the context (Li and Thompson 1981:138). The explicit and implicit subject pronouns can be different in their pragmatic effects, as we will see in further discussion in 4.2.2.

and academic science writers may be regarded as an indication of their different interactive goals[26].

In order to carry out a more comprehensive analysis, we need to bring in the discussion of the "impersonal dimension" of these personal references. Kitagawa and Lehrer (1990:742) proposed two other functions of personal reference besides the referential uses:

> Referential uses identify specific individuals.... An 'impersonal' use of a pronoun applies to anyone and/or everyone. A 'vague' use applies to specific individuals, but they are not identified, or identifiable, by the speaker.

A typical example of impersonal uses of personal references is as follows, an interview with a teacher of fictional writing:

(1) But I have a gift for teaching...Plus, teaching fiction writing is a lot like writing. *You* have to examine manuscripts, use *your* mind, come up with possibilities, respond to characters in situations. In a lot of ways, it's like working on *your* own work (from Kitagawa and Lehrer 1990:741).

According to Kitagawa and Lehrer (ibid.: 741), the second person pronoun does not refer to the addressee, i.e. the interviewer, but anyone who wants to be a teacher of fictional writing[27]. The *you* can be replaced by a generic pronoun *one* in this case. Actually, other personal pronouns such as *we* and *they* may also be interchangeable in this case without affecting the ideational meaning — but the pragmatic effects will be different. Fowler and Kress (1979:204) suggest that when *you* is chosen the speaker is "telling" the addressee something, but when *we* is chosen, the speaker cautiously avoids any potential antagonism in the process of communication, and acts as an insider. This impersonal use of personal reference has been observed to be very

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[26] This view of the use of first and second personal references is related to the previous discussion of pragmatics: intentionality and acceptability (2.2.4).

[27] However, it can be argued that the impersonal use of *you* in this example can be seen as referring to the addressee. This suggests that the line between impersonal and personal uses is not always clear-cut.

common in our corpus, and one of our main focuses will be to explore the writer's strategies in selecting from a pool of impersonal alternatives.

Vague uses are similar to impersonal uses in not referring to the addressee, but they refer to specific individuals that are not identified in the context of utterance. The following example is a speech given by a European woman on the topic of American political and military policy in Europe:

(2) *You*'re — I don't mean you personally — *you*'re going to destroy us all in a nuclear war (from Kitagawa and Lehrer 1990:743).

In this utterance, the italicised *you* refers vaguely to a particular group of people but the referents are not identified or identifiable in this utterance. They neither refer to the addressees (who are referred to by the non-italicised *you* in the inserted clause) nor can they be replaced by *one* as in the case of impersonal use. One way to distinguish impersonal and vague uses, suggested by Kitagawa and Lehrer (ibid.:743), is when quoting the vague uses we need to shift *you* in (2) to *we* (The European woman said to me that *we* — not *me* personally...), but the impersonal uses as in (1) do not need personal shifts (The interviewee said if *you* have to examine manuscripts...).[28]

Several Chinese researchers (Biq 1991, Lin 1992, Chen 1999) follow the model of Kitagawa and Lehrer to analyse conversational Chinese data. Their findings generally conform to the English categorizations with regard to these three main uses of personal references, but some of them propose more elaborate uses. For example, Biq (1991) proposes the meta-linguistic function of *ni* as vocative in conversations. Because their models are derived from spoken data and most of the elaborated uses do not appear in our written corpus, in our analysis we still draw on the main distinction between personal and interpersonal uses only.

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[28] It should be noticed that the categories of impersonal and vague uses made here are still more interactive than complete avoidance of personal references, for example, if we compare "you have to examine manuscripts" with "manuscripts have to be examined".

Alongside these similarities in the grammatical categorization and discourse functions, one salient difference in the use of personal reference in English and Chinese, however, has been pointed out in many contrastive linguistic studies. Chinese tends to use less personal reference than English. Huang (1994:248) suggests that maintenance of reference in Chinese is usually achieved first through a pronoun and then through a zero pronoun. Li and Thompson (1981:657) also point out that personal references are rarely used if they can be understood by the participants from the context. They further (ibid.:662) propose that what guides the text producer's choices between a pronoun and a zero pronoun is the intention to "highlight" the referents. Moreover, "the role of highlighting can be seen even more clearly in the use of the first and second person pronouns" (ibid.:663), since the role of text producer and receiver are usually understandable in a communication. Different frequencies of personal reference in English and Chinese can be a key factor in our analysis of the translator's use of personal reference.

In our analysis we will focus on the shifts of first and second personal references and their implications for different communicative purposes of ST and TT, and we will also bring in the consideration of different norms in the two languages. Shifts caused by inevitable changes in personal perspective from ST to TT (Richardson 1998), such as from *our country* in ST to *America* in TT, will remain important in our analysis because they are evidence of the conscious choices made by translators for their readers.

2.5.3 Junction

Junction is a set of surface signals that mark explicit relations between propositions of events and situation in texts. Junction functions as one of the cohesive devices that bind a text together. Halliday and Hasan (1976) provide a comprehensive semantic categorization of junctive relations:

Types of junctions	Examples
additive	and, or, also, in addition, furthermore, besides, similarly, etc.
adversative	but, yet, however, instead, on the other hand, nevertheless, etc.
causal	so, consequently, for, because, for this reason, etc.
temporal	then, next, after, finally, at last, etc.

Table 2.5 Halliday and Hasan's (1976) categories of English junctives

In Halliday and Hasan's study, junction plays an important role in textual organization. The semantic meaning of a junctive expression decides the meaning of a combination of passages. However, from an interactive point of view, the complexities of junction are far greater than the semantic rules imply. For example, the interpretation does not always coincide with the semantic value of a junctive.

In text-linguistic study, the role of junction is emphasised in how it helps writers to construct and readers to retrieve coherence in texts (e.g. Hoey 1983; see 2.2.3). Junction enables writers to organize propositional information in a way that can help the audience to read coherently and clearly. On the other hand, readers pick up junctives as signals to access the coherence designed by the writers. Deployment and interpretation of junction are actually a process of mutual expectations between writers and readers. Therefore, junction is widely recognized as an information-oriented and user-friendly interactive sign in texts (Thompson and Thetela 1995, see 2.2.1).

Most of the studies of interaction treat junction as an information-oriented device that helps text participants to process the text smoothly, but junction can also be used as a writer-oriented interactive feature (ibid.). Beaugrande and Dressler (1981) provide an insight into junction from a communicative point of view. They (ibid.: 74) point out that junctive expressions are rarely grammatically obligatory in text production, since most relations of textual sequences can be inferred by the reader from the co-text or contextual knowledge without explicit markers. Therefore the use of junction involves text producer's choices and the choices are made according to the communicative goal. From this perspective, Beaugrande and Dressler (ibid.:74-75) comment: "junction demonstrates how communicative interaction, not just grammatically obligatory rules, decides what syntactic format[29] participants use." In fact, junction is often manipulated by text producers to achieve their communicative purposes. For example, a decision to make a junctive explicit may be a courtesy to the reader by facilitating a more efficient reception, but it can also be the writer's desire to exert

[29] The communicative interaction also decides the semantic vale of junction that is realized through syntax, as discussed from Halliday and Hasan's (1976) perspective.

control over the readers' interpretation (ibid.:74-75). Moreover, a choice not to use junctive expressions can also create the effect of inviting more participation from the readers (Fowler 1986:67). In short, the purpose of using junction is not only for the reason of easy text processing or user-friendliness, but it can be a trace of the writer's attitude or point of view as well. Thus, there is a pragmatic dimension to the study of junction.

In translation studies, Baker (1992:192) points out that junction presents a difficulty to translators because languages vary in the type of junction they favour and the frequency of junctives they use. In the following we are first going to compare similarities and differences between English and Chinese junction at the semantic level. Previous studies found that Chinese and English junction do not differ much in their categorizations of functions (Liao 1992). Typical examples in each category are listed in table 2.6.

Types of junctions	Examples
additive	而且 *erqie*，又 *you*，此外 *ciwai*，還有 *haiyou*
adversative	雖然 *suiran*，但是 *danshi*，但 *dan*，不過 *buguo*，卻 *que*
causal	因為 *yinwei*，由於 *youyu*，所以 *suoyi*，因此 *yinci*
temporal	首先 *shouxian*，其次 *qici*，後來 *houlai*，接下來 *jiexialai*

Table 2.6 Categories of Chinese Junctives (based on Liao 1992)

However, a significant difference is that Chinese tends to use junction less frequently than English (Zhu *et al.* 2001:99). Chinese prefers parataxis whereas English prefers hypotaxis, so in Chinese junctive relations tend to be implicit. A quantitative comparison of BNC and the Chinese Sinica Corpus shows that English junctives occur at a frequency of 5.66% while Chinese junctives at only 3.81% (Chen 2005:164). A general conclusion is that Chinese prefers to mark textual relations implicitly, for example through lexical cohesion or contextual knowledge, whereas English tends to use more explicit junctive expressions. Because of the differences in the frequency of junction between English and Chinese, it is inevitable that translators have to make some decisions to cope with junction while translating.

Just as we follow a pragmatic framework by viewing junction as a product of communicative elements rather than merely syntactic or semantic choices, so we view the shifts of junction as a decision made by translators in order to conform to the translation purpose. Nevertheless, it should be mentioned here that there is also a trend in translation studies to view junctive explicitation as an inherent property of translation activity. Blum-Kulka (1986/2000) proposes the explicitation hypothesis, and states that a rise in the level of cohesive explicitness in the target text is a norm in translation regardless of the pair of languages involved. Baker (1996:181) further proposes corpus linguistics as being useful in the empirical study and suggests the optional *that*, explanatory vocabulary and junction as possible indicators for investigating explicitation. The studies investigating the explicitation hypothesis cover a range of languages, such as English (Olohan and Baker 2000), Finnish (Mauranen 2000), and Chinese (Chen 2006). Not all findings support the explicitation hypothesis, however. Puurtinen's study (2004) shows no significant differences in explicitness of junctives between translated and non-translated Finnish children's literature.

However, there is a trend in translation studies to begin to view junction shifts from an interactive perspective. Mason (1998) examines ellipted junction in translations as a strategy deployed by the translator under the target communicative, pragmatic and semiotic context [30]. Mason (ibid.:181), for example, comments that cohesive explicitation is not an unconditional rule but rather has to be analysed in relation to rhetorical purposes.

If we just accept the explicitation theory and take this phenomenon as an inherent feature of the translation product, then we may overlook the interactive dimension involved in the process of translation. Some studies refer to the phenomenon as an inherent feature of translation because of the special status of the translator being a text receiver and producer at the same time, and therefore it is "an inevitable result of the act of mediation" (Shuttleworth and Cowie 1997:55). However, a number of studies on translation explicitation refer to the writer-reader interaction as the motivation behind it. Blum-Kulka (1986/2000:304), for example, talks about "reader-

[30] The three dimensions of context are discussed in Hatim and Mason's (1990) translation model. See 2.3.2.

focused" explicitation, resulting from changes in reader configuration in the process of translation. Shuttleworth and Cowie (1997:55) also comment that translation shifts may be "avowedly philanthropic, motivated by the translator's conscious desire to explain the meaning to the TT reader." Furthermore, Pym (2005:37) refuses to take explicitation as simply inherent in translation and claims that "cooperation with the receiver may be the general aim of explicitation." In this sense, explicitation (especially optional explicitation) may be generally regarded as the result of the fact that the translator generally has a stronger interactive tendency than the source text writer because of the distance between the text and the readers. It is also suspected that the degrees of explicitness in translation may vary with different degrees of interactive intention (for example, popular science on one hand and academic science on the other hand); however, to prove this, more research and evidence are needed. The point we try to make is that explicitation in junction should not be taken simply as a phenomenon belonging to the product of translation, but the translator-reader interaction in the process of text production and reception plays an important role.

The reason for investigating junctive patterns in this study is not only because junction can be an indicator of writer-reader interaction, but also because the pattern of junction is an important generic characteristic of English popular science writing. A significant finding in English popular science texts is that writers tend to use more explicit junctive expressions because the target readers are laypeople without scientific knowledge (Myers 1991:21). According to Myers (ibid.:21), academic science writings use fewer junctives because cohesion is largely achieved through lexical cohesion. He explains the different junctive patterns in the genre of popular science as a reflection of different ways of understanding the text by lay and expert readers: expert readers make sense out of lexical cohesion whereas lay readers rely on explicit junction to interpret texts. Therefore, junction seems to be an important indicator of the writer's consideration for readers in the genre of popular science.

Finally, before we conduct the analysis, it is necessary to bring into discussion a long debate in the literature of junction as to what actually constitutes a junctive. Halliday and Hasan (1976), from a semantic point of view, consider only words and phrases that make connections across the boundary of sentences as conjunctions. But

Beaugrande and Dressler (1981:71) consider that "a clear device for signalling the relationships among events or situations is Junction." In other words, from a pragmatic perspective, junctives are any linguistic feature that can help producers to construct "organization and presentation of a textual world" and that can help "imply or impose a particular interpretation" (ibid.:75) on text reception, whether they link words, clauses, sentences, or paragraphs. In text-linguistics based translation studies, Hatim and Mason (1990) and Baker (1992) share this broad view of junction. Therefore in the present study we do not make distinction between inter- or intra-clausal junctives. The quantitative analysis will calculate words or phrases belonging to the traditional grammatical category of connectors, regardless of the propositions that they connect. In the qualitative analysis, the distinction between inter- and intra-clausal connections may be brought into discussion if it is relevant in the context.

2.5.4 Hedges

Hedges can be defined in simple terms as expressions of uncertainty. They are regarded as an important indicator in the study of the writer's attitude. The linguistic concept of hedging was first introduced by Lakoff (1972), who, from a semantic perspective, defines hedges as linguistic devices that increase the fuzziness of a concept. With hedges, more ideas can be expressed regardless of limitations on conceptual categories in natural languages. In the semantic realm, hedges are regarded as an indication of the degree of the "truth-value" of the proposition.

Since the 1980s, the study of hedges has moved towards a pragmatic study. Linguists are more interested in how hedges suggest the attitude of the text producers rather than the truth-value of the proposition. Hedges are regarded as having an important role in human communication, and the hedging phenomenon is often related to the politeness theory formulated by Brown and Levinson (1987)[31]. Myers (1989), for example, regards hedges as an essential negative politeness strategy in scientific writing, because science writings always include a claim and the act of making a claim is a Face Threatening Act, which either asks for credit from the public or restricts what other in-group members can do. In this sense, hedges are used as a politeness strategy to mitigate the relationship between science writers and the science

[31] See review of politeness theory in 2.2.5

community. Myers (ibid.:5) concludes that the weight of an FTA is measured not by the content of the claim but by the social relationships between the writer and the science community.

Hyland (1998) is not in denial of Myers' model that all hedges are more or less related to the power and solidarity between the writer and the community, but argues that "a straightforward application of imposition, distance and social power does not explain scientific hedging" (ibid.:177-178). He categorizes the motivation of using hedges in three broad categories: content, writer, and reader (as shown below in figure 2.2).

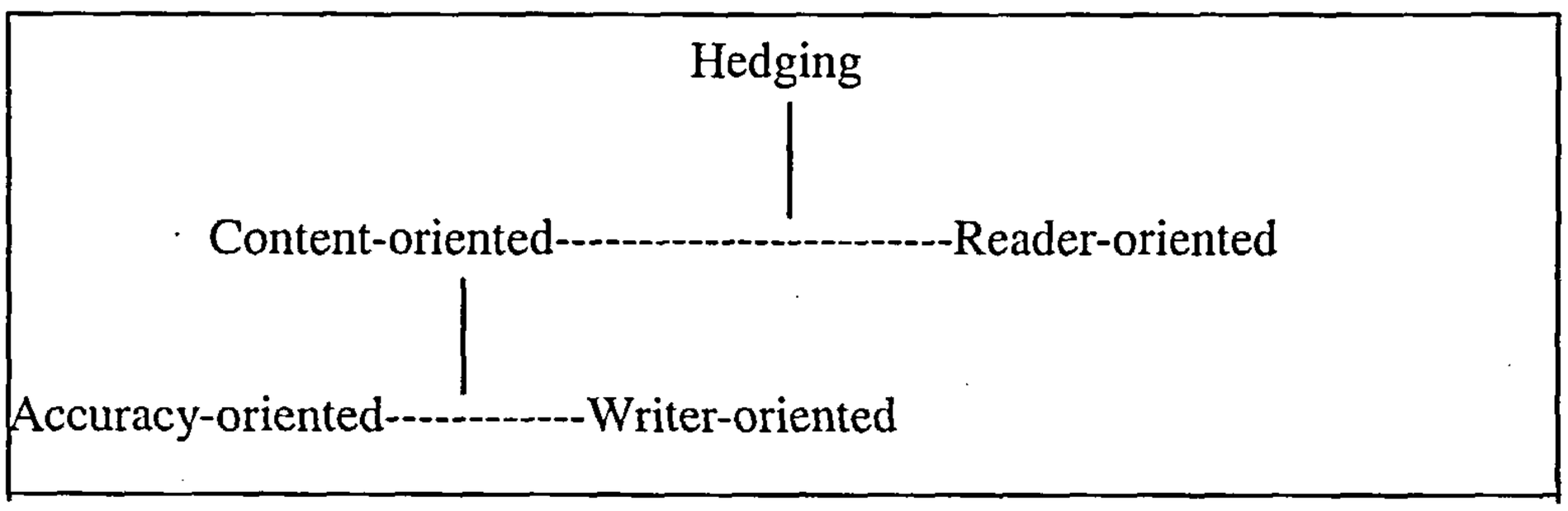

Figure 2.2 Hyland's model of scientific hedging (adapted from Hyland 1998:156)

In figure 2.2, hedges are divided into content-oriented and reader-oriented functions, and the content-oriented functions are further divided into accuracy-oriented and writer-oriented functions.

The accuracy-oriented use of hedges functions to modify the proposition with indications of uncertainty with the purpose to inform the readers more accurately of the gap between the ideal and the best scientific information that the writer can provide. It is argued that hedges are used in the genre of science in order to increase precision of the scientific information — in the sense that a departure from an ideal is more precisely indicated — and the motivation behind them is the admitted limitations of knowledge. Some common linguistic devices used for this purpose are degree-of-precision adverbs such as *quite*, *more or less*, *approximately*. A common situation in which these hedges are used is when the statistics of results or findings are presented. Although the scientist tries to be as precise as possible, there can often be a gap between the ideal figures and the reality. The use of these hedging adverbs

"indicates that results vary from an assumed ideal of how nature behaves and allows a better match with familiar descriptive terms" (Hyland 1998:164). In other words, the use of these hedges actually helps the scientists present their findings or results in a more precise way.

Writer-oriented hedges, unlike the proposition-focused accuracy-oriented ones, are often motivated by the writer's concerns about possible consequences of negatability and therefore hedges are used to minimize the writer's personal involvement. This type of hedges is often used when the writer seeks to make a claim but does not have solid support for it. Some linguistic devices used in this way include impersonal structures or nominalizations, which move the reader's focus onto the claim itself rather than onto the writer's responsibility in making the claim. These hedges prevent the scientists from being criticized when they make claims based on their preliminary findings, small samples, doubtful evidence, uncertain predictions, etc. (ibid.:176).

Reader-oriented hedges concern the writer's relationship with the readers, more specifically, the acceptance by the readers. This is when Myers' (1989) consideration of social negotiations and power plays the most important role. If the use of impersonal structures is regarded as a feature of writer-oriented hedges, reader-oriented hedges are often characterized by the choice of personal subjects, mostly *we* — "an overt acceptance of personal responsibility mitigates the expression of a proposition and signifies a reader-oriented hedge" (Hyland 1998:181). This is often used when the writer wants to criticize the works of others.

In figure 2.2, the use of hedges is divided into several categories. This categorization may seem clear-cut, but as Hyland (ibid.:185) admits, in actual use a hedging device is often operated to achieve more than one goal. However, the model can still be used as a guideline because there seem to be some hedges that are more representative or prototypical in one category than the other, as the linguistic devices suggested in each category in previous paragraphs.

Researchers of hedging in the science genre provide a base for those investigating the genre of popular science, but the results generated seem to be conflicting. The

scholars who use the functions of hedges in academic science writings as a yardstick to measure their roles in popular science writings (e.g. Fahenstock 1986, Myers 1989) claim hedges are less essential in the context of popularisation, because the tension between the scientist and the peer groups no longer exists[32]. From the opposite angle, Crystal (1988:47) claims that it is natural for hedges to appear in popular science writings because it is a genre in which "the author knows that the audience only needs the 'half truth'", and is surprised that hedges should be as common in a specialized context. These opposite points of view signal an important insight: hedges actually possess different functions and roles in different communicative situations.

Varttala (1999) offers two suggestions regarding the frequent use of hedges in the genre of popular science, by comparing the data from specialist research articles and *Scientific American*. The first suggestion is similar to Crystal's (1988) argument that hedges are used in the texts to meet the low need for exactitude in popular science. This can still be regarded as how the writer cares for the reaction of the readers – for example, a high exactitude of numbers and figures may make readers uneasy, but the motivation is different from the above suggestion that the writer uses hedges to avoid challenges from the science community. Another suggestion is that the writer of popular science may use hedges to signal explicitly to the readers the uncertainty of the information, given that the general readers may not have enough knowledge to tell between an uncertain proposal and an established rule in this field.

This review of hedges shows disagreement to some degree, but actually the various accounts complement each other and offer a solid ground for the present study. In brief, Myers (1989) provides the ground for regarding the writer-reader relationship as the core in the use of hedging phenomena. Hyland's (1998) model then provides an insightful observation that certainly the three functions cannot be separated — all the uses of hedges are related to the proposition, the writer and the readers, but there is a spectrum within which the proportion of influence of these three parameters differs. This can be a useful indication in investigating the individual hedge in this study.

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[32] Myers (1989:28), however, points out that another form of tension may exist between popular science writers and readers, i.e. to avoid insulting the lay readers and to establish solidarity with them. Besides, in audience design (Bell 1984, see 2.3.1), even though the science community is not an addressee of popular science writing, it can still have influence over the writer as a referee group.

Varttala (1999) offers important suggestions that there are reasons for the use of hedges other than those in academic science writings, and this difference is largely related to the writer-reader configuration.

Compared with the study of hedges in English, there is a lack of systematic study of hedges in Chinese. Some scholars (e.g. Wu 1999), based on Lakoff's (1972) study, discussed the philosophical concept of vague language in Chinese — such as the semantic boundaries of colours and their implications for human thoughts. Wu mentions hedges briefly as a category of vague language, but there is no clear definition of what constitutes the category of hedges in Chinese and there are few analyses of hedges in texts. Therefore, the analysis of hedges in Chapter 4 and 5 will be based generally on the study of English hedges reviewed in this section.

2.5.5 Concluding Remarks

In this section we reviewed four linguistic features that will be used as an indicator of interaction in the corpus in the following text analysis. The reviews show that the four parameters are closely related to the definition of interaction in the present study (see 2.2.1) - they demonstrate how the text producers show consideration for the readers, and they also give traces of the text producers' presence and attitudes in the texts. The review suggests that the use of these four features can be motivated by complicated reasons, and we have to approach the analysis by considering the stances of both the writers and the readers.

2.6 Conclusions

In this chapter we identify the areas relevant to the present study, and filter and derive from them a theoretical model that is appropriate for the investigation of the aims for the present study. In 2.1 we review the general accounts of the genre of popular science in English and identify that the current trend is to focus on the communicative dimension in the texts, particularly those related to the relationship between the writer as an expert and the readers as laypersons; whereas in the writing of Chinese popular science, the writer-reader interaction has not yet been identified as the main characteristic of the genre. We develop a theoretical model to analyze interaction in written texts from heterogeneous studies of text-linguistics and discourse analysis, and

approach the texts from both a top-down and bottom-up direction. Then the target-oriented translation studies contribute to distinguish the source text writer's interactive strategy from the translator's strategy, and polysystem theory further provides a ground to explain the translations' potential in creating a new genre in the target culture. The final section reviews the studies of four linguistic features – deixis, personal references, junction and hedges, from an interactive point of view. The interactive functions of these features will act as guidance to our interpretation of textual analyses in chapter 4 and chapter 5. The methodology used to carry out the research based on these frameworks and the corpora that will be used in the present study will be described in the next chapter.

CHAPTER THREE
CORPORA AND METHODOLOGICAL ISSUES

This chapter is devoted to the description of the corpora and methodology that will enable us to achieve the aims set out in Chapter 1, based on the theoretical framework proposed in Chapter 2. The corpus-based methodology will first be reviewed in 3.1. The corpora designed and compiled for the purpose of the present study will be described in 3.2. The process of data analysis and some methodological issues involved in the process of investigation will be discussed in 3.3.

3.1 A corpus-based Approach

Given that the present study is corpus-based research, it is necessary to review the development of corpora in translation studies and explain why a corpus-based methodology is adopted here. A widely accepted definition of a corpus today is "collections of texts held in machine-readable form and capable of being analysed automatically or semi-automatically in a variety of ways" (Baker 1995:225). The application of electronic corpora in linguistic research has revolutionized traditional human intuition-based research with at least four advantages (McEnery *et al.* 2006: 6): (1) speedy and easy manipulation of data; (2) accurate and consistent processing of data; (3) reliable results with little intervention of human bias; and (4) repeatable and further processing of the same data. As translation studies have moved from a conceptual to a situational perspective, evidence from large-scale authentic linguistic data set becomes important to support translation theories, and corpus linguistics has begun to be widely applied in translation studies.

Baker (1993, 1995) first proposed the use of corpus linguistics in translation studies as a tool to test the hypothesis of translation universals, i.e. features that distinguished all translated utterances from non-translated utterances, regardless of language pairs. After more than a decade since Baker's first proposal, the number of corpus-based translation studies has quickly increased and the topics covered are also more varied. Besides the test of translation universals still being a popular issue (Olohan and Baker 2000, Kenny 2001, Ghadessy and Gao 2001, Chen 2006), the corpus approach has been applied to areas such as translator training (Bowker and Pearson 2002) and

research topics such as the translator's style (Baker 2000, Bosseaux 2004) and translation of ideology (Munday 2002). As the basic features of corpus tools—frequency list, type-token ratio, sentence and word lengths, lexical density, etc. (Olohan 2004:77-81) — have been explored by researchers in a variety of data, the question that arises is: what do we do with these computer generated statistics? These questions can be related to the key objections to corpus-based linguistic studies, and also to the increasing emphasis on contextualization in this approach.

The corpus approach is proposed as being a more reliable and scientific tool than the intuition-based approach, but whether it can be regarded as an objective approach is always controversial. Widdowson (2004:120), for example, comments: "The only fact we have is that certain selected formal features occur with a certain frequency. But it is not a fact that they are an index of ideological significance." In other words, it may be objective when we present the figures and statistics, but when we try to explain and interpret the figures, objectivity becomes questionable. In fact, even whether the computer-generated statistics are objective is in debate, as Malmkjaer (1993:214) argues that machine-generated statistics do not necessarily reflect the usage of language in human consciousness. The limitations of corpora become still more obvious when linguists are interested in a wider context of language use. As Hermans (1999:93-94) argues, a corpus can reveal only the linguistic make-up of texts but cannot help reveal the status of translation in a culture – related to polysystem theory (2.4.1).

Despite these drawbacks, it is however undeniable that the corpus-assisted approach helps linguistics (including translation studies) scholars to investigate what was impossible before. Therefore, the solution is not to resist corpus tools at all but to integrate generally decontextualised corpus analysis into a more contextualised framework. Mason (2001:71), for example, emphasizes that contrastive analysis based on a corpus needs to be sensitive to the semiotic context in which the texts are situated, i.e. genre, discourse and text purpose. With the awareness of the drawbacks of simply relying on computers, and with the desire to explore further the potentiality of this methodology, the current trend in corpus-applied studies is to adopt a combination of quantitative and qualitative approaches (Olohan 2004: 86). Quantitative studies can

provide the foundation and point a direction for qualitative analysis, and qualitative studies can make further use of the computer-generated statistics.

So far, corpus linguistics has been widely used to explore textual and co-textual features, but locating the corpus findings in a social context is a comparatively new area. Even when the term "context" is used, it often means co-text (the chunks of texts surrounding the key words), or often individual speech acts, rather than the study of texts in the wider social cultural context (discourse and genre, see 2.2.6). However, an an increasing number of corpus analysts have started to experiment with the corpus-assisted approach, notably in the field of politics (Johnson *et al.* 2003, Saraceni 2003, Partington 2003). In translation studies, Munday's (2002:77) model also displays how the general statistics of word counts, type-token ratios and average sentence length can be further examined against their metafunctional profiles (ideational, interpersonal, and textual, following Halliday 1985). The model involves three steps: (1) locate the ST and TT in their own cultures and produce respective metafunctional profiles; (2) compare the metafunctional profiles and identify linguistic shifts; (3) relate the linguistic features identified to their cultural impact. Even though the model involves three steps and aims to involve wider contextual factors, in Munday's analysis only the first two steps are actually conducted and the third step is left in the form as a list of suggestions of potential directions that can be pursued. And it is this potential area that the present study intends to explore further. Furthermore, although the model is very clear and comprehensive, we find that between the metafunctional level and the cultural implications, the level of rhetorical purposes or text producers' intentions is neglected. In section 3.3, the design of the analytical model chosen for the purpose of the present study, based on the foundations reviewed here, will be presented and explained. But before we deal with the analytical model, let us first look at the SA corpus constructed for the aim of this study.

3.2 Design of the SA Corpus

As specified in the initial observation (1.1) and in the review of popular science in Taiwan (2.1.3), the present study is motivated by the publication of the Chinese edition of *Scientific American*. Before proceeding to the details of corpus compilation,

it might be helpful to look at the background of the English SA and the Chinese edition.

3.2.1 Background of the SA Corpus

Scientific American is the leading popular science magazine in the US with a history of more than 150 years. It is now translated into 15 languages in 19 countries and has a monthly circulation of one million worldwide[33]. A variety of topics, such as biology, cosmology, information technology, nutrition and health, physics and other fields that are of interest to the general public, is covered in the magazine. The texts can be categorized into different sub-genres, such as feature-stories written by scientists who conducted the research, news reports written by journalists, question and answer columns answered by the scientific experts, or reviews of recently published popular science books. The texts are often presented with colourful illustrations and reference columns supplying background information for easier readability.

The first Chinese SA was officially launched in Taiwan in February 2002, with a trial version published in January 2002. As stated by the chief editors, the aim of Chinese SA is to provide a canon of popular science writing from the Western world and to encourage popular science writing in Chinese[34]. The Chinese edition is generally based on the English source but has a very obvious difference: the English title *Scientific American* becomes *Scientific People* in Chinese. The Chinese editor explains this change as stressing "the spirit that science belongs to everyone" (SA Chinese website, our translation[35]). Another reason for this change is that the Chinese edition includes both translations from English editions[36] and a small portion of non-translated articles written by Chinese writers. The original Chinese writings include

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[33] Data accessed from English SA website: http://www.sciam.com/page.cfm?section=international (Last accessed on 31st October 2007).

[34] The statement in Chinese is: "《科學人》雜誌不僅完整引進西方科普作品的典範，也要積極推動華人科普創作的發展，這種努力是中華文明全面提升不可缺少的一個環節。" Available from http://sa.ylib.com/about/about04.asp (Last accessed on 31st October 2007).

[35] The explanation can be accessed on http://sa.ylib.com/service.asp#1 (Last accessed on 31st October 2007).

[36] According to the editor (Zhang, M. 2006), the Chinese edition usually includes all the English articles but if there are problems with space usually news reports that are of less relevance to the Taiwanese readers would be left out.

the views of Chinese scientists on the same topics[37] discussed by Western scientists, and reports on scientific news in the Chinese community.

The difference in the contents inevitably leads to different layout and editing between the English and Chinese versions. The articles are arranged in a different order in the Chinese edition, and the feature stories on the cover also often differ. The changes are made for different interests or reading habits of the target readers. The Chinese readers not only differ in cultural background, but also differ in terms of their age and education background — the Chinese readers tend to be younger and school students, whereas the English readers are older and more professional (Zhang, M. 2006). But the layout of an individual text — its columns and illustrations — remains almost identical, unless sometimes the Chinese characters may take more spaces than English words do. Sometimes Chinese translations add more background information, either by inserting explanations in the main text or adding additional reference columns beside the text, to help the readers understand the main text easily. Easy readability as a priority concern has made the editor decide not to supply the English original after proper nouns, in contrast to the usual strategy of scientific translation in Chinese. On the website[38], the publisher gives three explanations. First, it suggests that other translated scientific articles tend to include the English proper names because of a lack of confidence in the accuracy of their translations, while the Chinese SA is translated by a group of scientific experts and they spare no effort in making their translation accurate and consistent, so the inclusion of the English source is not necessary. The second reason is that inserting English words too often makes the Chinese texts look disorderly, and also makes readers process texts less smoothly. Furthermore, the inclusion of English terms would take too much space and the magazine has only limited space for an article.

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[37] When an English article is regarded as too difficult, the editor invites Chinese scientists to write an introduction to the issues or the relevant development in the Chinese science community. Also, when the English articles do not contain enough background, the editors or the journalists write a background story of the event. Even in rare cases, because the Chinese edition is one month behind the English issue, the Chinese edition may supply some follow-up report if a breakthrough has occurred during the month.

[38] http://sa.ylib.com/service.asp#2 (Last accessed on 31st October 2007).

This brief account of background information about the SA corpus will provide a useful extra-linguistic context for the text analysis in the present study, especially regarding the differences resulting from different readerships.

3.2.2 Corpus Compilation

The SA English and Chinese magazines provide very good data that enable us to compare the English source texts and the Chinese translations — to investigate the translator's strategy, and to compare the Chinese translations and the Chinese non-translations — to identify any potential evidence of the influence of translations and the creation of a new genre. For the purpose of the study, two corpora were compiled: an English-Chinese parallel corpus and a Chinese comparable corpus. The definitions of parallel and comparable corpus here follow those of Baker (1995). A parallel corpus includes a set of source language texts in language A and another sets of texts of their translations in language B (ibid.:230). Comparable corpora include two sets of texts from the same language: one corpus consists of non-translated texts in a certain language and the other consists of translated texts in that language from a given source language (ibid.:234). Also, as one of the objectives of the present study is to conduct a quantitative analysis of recurrent patterns in the data, the corpora were designed to be large-scale and in a machine-readable form.

The first step was to collect English texts from the English *Scientific American* magazine and Chinese translations and non-translations from Chinese *Kexueren* published in Taiwan. Both English and Chinese publishers have their websites on which selected articles in each issue were published. To save the trouble of scanning paper into electronic files, we decided to collect texts based on those selected articles available on the website. The publication period is restricted to the period from January 2002, when the trial issue of Chinese SA was published, until February 2005, when the corpus was constructed. For the English-Chinese parallel corpus, we collected all the articles that have both English source text available on the English SA website and Chinese target text available on the Taiwan SA website. For the comparable corpus, we included the translations collected in the parallel corpus and collected all the Chinese non-translations that were available on the Taiwan SA website. Both translated and non-translated texts come from the same magazine and

hereby the same "genre". To ensure comparability, we excluded those texts within the magazine that do not belong to the prototype of popular science genres, such as the preface, advertisements, the question and answer column and games. Book reviews that were often in Chinese non-translations but not English and Chinese translations were also excluded. The remaining texts in the corpora were mainly feature stories written by scientists, news reports written by journalists, and some argumentative analysis written by scientists. The texts included in the corpus cover headline, by-line, names of authors and/or translators (including their introductions in brackets beside the names), and the main body of the texts. Pictures and explanations of pictures, columns and boxes placed beside the main texts to supply further information were omitted from the webpage because they were not part of the main texts. Some of the texts were available online in full texts while others were only partially available. For example, if an article was too long, usually the first 1500 English words or 3000 Chinese words or so at most were provided online. Given that the aim of the present study is to look for recurrent patterns throughout the corpus, reductions are considered not to influence the results of the analysis. Based on these criteria of selection, we finally compiled the following corpora:

Corpus	English source texts (SA-E)	Translated Chinese (SA-TC)	Non-translated Chinese (SA-NTC)
Number of texts	66	66	77
Words[39]	103,004	109,985	82,804

Table 3.1 SA corpora complied for the study[40]

The issue of copyright permissions is also important at the stage of corpus design (Olohan 2004:50). Requests for permission were made to both the English and Chinese publishers. Permission is granted by the Chinese *Kexuren* magazine, but not by the American pulisher *Scientific American*. However, according to the terms and conditions of the publisher, *Scientific American Digital* subscribers can download articles to the user's computer for free[41]. Therefore, given that we have subscribed to

[39] In order to compare to the number of English words, the figures provided in SA-TC and SA-NTC here are not characters but words, i.e. characters that were segmented.
[40] The complete lists of texts included in the corpora are in Appendix A.
[41] https://www.sciamdigital.com/index.cfm?fa=Account.ViewRegistrationAlt (Last accessed on 31st

Scientific American Digital, we can download the articles to the computer. Nevertheless, we are not allowed to reproduce texts in this thesis and that is why some examples and case studies are not presented in full text, and only links to webpages are provided. Nevertheless, in the UK, the terms of "fair dealing" (*Copyright Licensing Agency* website[42]) allow individuals to make a single copy of a reasonable proportion of works for the purpose of non-commercial activity, including research. The terms of fair dealing can apply to the short English samples quoted in this thesis.

3.2.3 Corpus processing

The program used to process the data is *ParaConc*, a multilingual concordancer developed by Barlow (1995). In order to import the data collected into the program, we needed to make the data conform to the format accepted by the program. First, all the electronic texts downloaded from the website were saved as plain text files. The Chinese texts then had to be segmented. Chinese is a character-based language with no clear boundary between words, but *ParaConc* recognizes a word based on the space between words, so a process of segmentation needed to be carried out. We segmented SA-TC and SA-NTC by a segmenting program developed by the Natural Language Processing Laboratory of National Tsing Hua University in Taiwan, which followed the standard of segmentation issued by the Academia Sinica Corpus. The segmentations - especially the segmentation of science terminology and proper nouns - processed by the machine were then checked manually in order to ensure accuracy. The next step was to align English and Chinese texts. Although *ParaConc* has an automatic alignment function, we decided to align the texts manually based on the unit of sentence, because Chinese and English sentence structures are of great difference. The unit of sentence here was recognized by the full stop, and sometimes question marks, exclamation marks or even semicolons if the fragments between two stops were considered too long to be read as a concordance. After the data were properly managed, they were imported to the software, ready for the search function. Although *ParaConc* is designed for parallel corpora, comparable texts could also be imported into the software and a search function could also be carried out. Therefore,

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October 2007).

[42] <http://www.cla.co.uk> (Last accessed on 31st October 2007).

the raw figures obtained in the present study — both for the parallel corpus and the comparable corpus — were all generated by *ParaConc*.

3.2.4 Reference corpus

A Chinese reference corpus of texts belonging to the genre of scientific writing is also included in the present study as representative of the Chinese norm with which Chinese SA corpora can be compared. The reference corpus is a sub-corpus consisting of texts in the field of science and in written form taken from the five-million-word Academia Sinica Balanced Corpus of Modern Chinese, known as the Sinica Corpus. The size of this written science subcorpus (hereafter SC-SCI) is 566,717 words. In this reference corpus, there is no distinction of science writings for different purposes and occasions, so the reference corpus covers a variety of sub-genres, such as government science reports, journal articles, science news reports, scientific stories for children, museum web pages, etc. Arguably, the reference corpus is not entirely comparable with the SA corpus because they are not written for the same purpose. But, on the other hand, the reference corpus will unavoidably be incomparable, because the starting point of the present study is that the genre of popular science does not exist in traditional Chinese science writings. Besides, SC-SCI includes texts with varying degrees of specialization (i.e. not only "hard-science" texts). Therefore, SC-SCI can still be regarded as being representative of the general features of science writings in Chinese, and can be compared with the SA Chinese corpora as a special type of science writing. A web-based search interface is available online,[43] and in order to access the full texts, we purchased the corpus in the form of a CD-ROM from the Academia Sinica.

Overall, to fulfill the aims of the present study, four corpora are included: SA-E, SA-TC, SA-NTC and SC-SCI. In the analysis of the translators' interactive strategy (the first aim), SA-E is compared with SA-TC, and SC-SCI is used as a reference. In the analysis of the creation of a new genre via translations, SA-TC is compared with SA-NTC, and SC-SCI as a reference is also included.

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[43] http://www.sinica.edu.tw/SinicaCorpus (Last accessed on 31st October 2007).

Parallel Corpus			
SA-E 103,004 (words)	SA-TC 109,985	SA-NTC 82,804	SC-SCI 566,717
	Comparable Corpora		

Table 3.2 The corpora for the investigation in the present study

3.3 Analytical procedures and problems

This section sets out to present an analytical model that can make use of the corpus-based approach and integrate it with the theoretical framework of interaction reviewed in chapter 2, basing on the data collected for the present study. The model mainly includes four steps, as shown in figure 3.1.

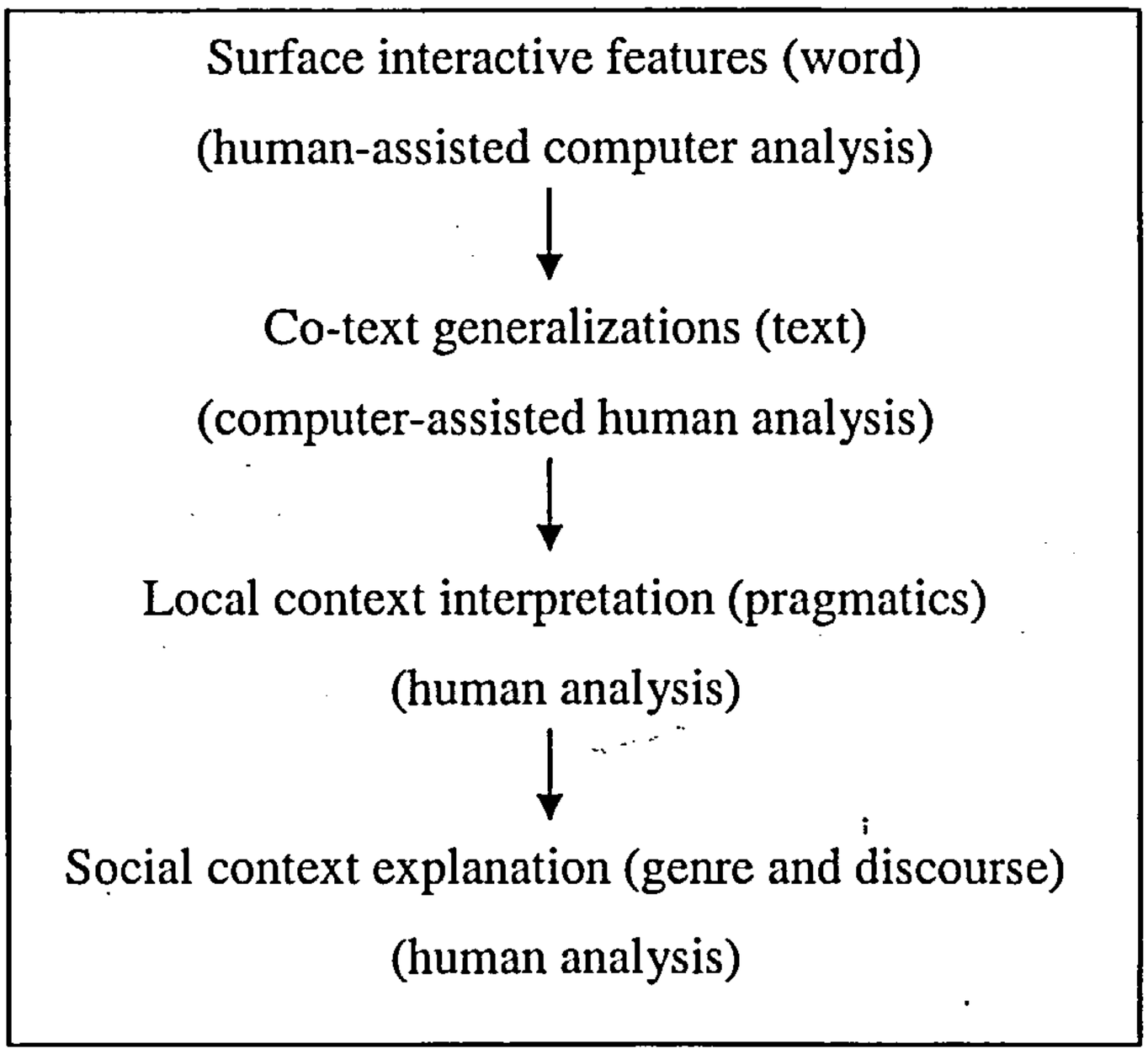

Figure 3.1 The analytical process of writer-reader interaction

3.3.1 Statistics of Surface Interactive Features

In the first steps we quantify evidence of interaction by indicating the frequency of selected interactive features. At this level, Halliday's (1985) SFG and Hoey's (1983) reader-oriented interactive signals provide important resources for analysis of what

linguistic features are mostly used by text producers to achieve certain interactive functions. Besides, toolkits from other studies that are reviewed in Chapter 2 regarding interaction between writer and reader, such as CDA and politeness theory, are also used as references. In the first step, we conducted a pilot study based on a pair of parallel texts in order to see what linguistic features may be more useful indicators specifically for our data. The list of candidates examined in the pilot study included lexical choice, transitivity, theme-rheme pattern, deixis, junction, hedging, person reference, textual organization, presupposition, etc. Since in the first step our aim is to quantify the interactive phenomenon in texts, it was decided that at this stage we should select features that can be processed by a computer in order to look for recurrent patterns. The final list decided upon was **deixis, personal reference, junction and hedging**. The four features can be easily processed by the computer software and, more important, they provide salient indications of the interactive strategies adopted by text producers in each corpus involved in the study. In this step, we adopt a human-assisted computer analysis. We use the computer to calculate the selected key words in each interactive feature in all the corpora: SA-E, SA-TC, SA-NTC and SC-SCI.

To compare further the differences between SA-E and SA-TC, we also calculate the number of translation shifts. Most of the statistics can be automatically generated by the software *ParaConc*; not only the number of occurrences, but most of the translation shifts can also be observed in *ParaConc* with its **translation** and **hotword** functions, which show the equivalence in the translations based on a statistical method (see Barlow 1995). Needless to say, the statistics generated by the computer can never reach 100% accuracy. To identify an equivalent accurately in translation is even more difficult when the strategies of omission and addition are involved. Therefore, the calculation of translation shifts involves a certain degree of human assistance. The calculation of raw figures of occurrences can be more easily done automatically, but when a word has several meanings or ambiguity is involved, human-assistance again plays an important role. Therefore, in the first stage, we try to limit the concept of interaction to a number of the most important key words related to the interactive strategies, and to identify their recurrent pattern in a large-scale corpus. The purpose is to see the pattern more clearly in a decontextualised corpus. Nevertheless, other

related interactive features are not excluded from the analysis. Those which are not included at this stage — features such as transitivity and presupposition which are more difficult to quantify — will be brought into the discussion in the contextualised analysis whenever relevant. For example, a discussion of shifts in personal reference seems inevitably related to shifts in transitivity, and shifts in demonstratives may also be related to the concept of presupposition. Therefore, it should be stressed that the first stage was not designed to cover thoroughly all the interactive features displayed in the corpus, which, of course, would be impossible, but to point in a direction that can narrow the focus for contextualised analysis.

In Chapter 5, in order to identify the significance of differences among the three Chinese corpora, we will use a statistics tool – the log-likelihood test[44], which counts the number of tokens and their percentage in the total corpora and then calculates whether these differences have statistical significance. More details will be provided in the introduction in 5.1.

3.3.2 Co-textual Generalizations

The second step is to read concordances and try to make a generalization of the textual patterns in which the key shifts occur. The main steps in reading concordances are proposed by Sinclair (2003:xvi): initiate, interpret, consolidate, report, recycle, result and repeat. "Initiate" means to look for the immediate co-texts and try to identify any repetitive patterns. "Interpret" is to try to form a hypothesis that can link these patterns together — for example, in our corpus we found that the additive junctive *and* that is mostly retained without shifts in translation tends to be in sentence-initial position and with cohesive (rather than structural) functions[45]. Next, "consolidate" means to look for further evidence to support the tentative hypothesis, such as looking for the non-sentence-initial *and* with other cohesive functions and observing the trend in translation. The next step is to "report", i.e. to write down the explicit hypothesis. Then, "recycle" the hypothesis by repeating the same procedures but trying to look at the strongest counter-evidence against the hypothesis — for

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[44] An online log-likelihood test calculator and a more detailed account of its statistical theory are available on http://ucrel.lancs.ac.uk/llwizard.html (Last accessed on 31st October 2007).
[45] The distinction between cohesive and structural junction follows that of Halliday and Hasan (1976: 234). See also 2.5.3.

example, whether there is also a high tendency of non-omission of the structural *and*. Then, modify the results with observations from counter examples. The final step is "repeat", i.e. to apply the hypothesis to new data, such as other junctives, and see if the hypothesis is still valid. The importance of generalising textual patterns is to distinguish what is usually taking place in the corpus from what is not, and this can lead us to explore further the pragmatic and semiotic significance behind the pattern observed.

3.3.3 Pragmatic Significance

The third step is to link textual patterns to pragmatic choices. At this stage, it is important to consider the intention of the utterances being investigated. For example, the use of deixis when the writer explains a theory serves different functions from when the writer describes a scene. Another example is that hedges serve different purposes when the writer makes a scientific claim and when the writer is chatting informally with the readers. The purposes of the text can be accessed by observing the co-text, such as the introduction of the texts and any other textual clues. Following the pragmatic approaches of Beaugrande and Dressler (1981) and others, we regard texts as traces of communication and an accumulation of selections in order to achieve rhetorical purposes. In the translation, a translation shift can often result in different pragmatic effects. But before we go into the translators' intentions and choices, it is necessary to make distinctions amongst three types of shifts. Different types of translation shifts are discussed mainly in the study of the phenomenon of explicitation. Blum-Kulka (1986/2000) distinguishes amongst grammatical differences, stylistic preferences, and the process of translation itself. Klaudy (2001) summarizes four types of shifts in explicitation: obligatory (grammatical and semantic levels), optional (grammatically correct but unnatural), pragmatic (such as explanations added by the translators), and translation-inherent explicitations. The latter type of explicitation is a result of the necessity to formulate the ideas conceived in the source language and present them in the target language. The two distinctions, although in different categories, actually overlap with each other. Considering the translator's constraints in making choices, we can mainly define and distinguish three types of translation shifts: obligatory, preferential, and optional (the term used following Calzada Perez 1997: 130, based on Halliday's (1985) taxonomy).

Obligatory shifts: The translator has no choice but to shift, mainly for grammatical or semantic constraints imposed by the source and target language systems. If the translator does not make shifts, the translation will be incorrect grammatically or otherwise unacceptable.

Preferential shifts: The translator has choices not to make shifts but is constrained by the norm in the target language. If the translator does not make shifts, the translation will still be correct but will be marked (thus generating additional effects not found in the ST) or be clumsy or unnatural.

Optional shifts: The translator has choices to make shifts or not in order to relay intended effects — for example, for the purpose of translations or target readers.

At this stage we bring the literature of contrastive studies between source language and target language into the examination of the translation shifts observed in SA-TC. Grammatical differences or stylistic preferences in English and Chinese will assist in determining the type of shifts identified. Given the aim to explore interactive strategies used by the translator, our focus will be particularly on optional shifts and preferential shifts, because obligatory shifts do not involve translators' choices. It is then that we start to explore the possible motivations of choices behind the translation shifts based on the context of individual texts.

Another important concept at this stage related to the text producers' intention is the notion of markedness. In the use of language, it is generally agreed that there is a contrast between a marked form and an unmarked form (*cf.* Levinson 1983; Fletcher 1985; Hatim and Mason 1990). An unmarked form is a preferred form that occurs more frequently or follows the expectation of language users. A marked form, on the other hand, occurs infrequently and unexpectedly and therefore is less preferred. Since a marked form is less used, when the text producer chooses to use a marked expression it usually generates additional pragmatic effect by making the readers spend more effort processing the information. Therefore, markedness will be an important indication of the strategies adopted by translators and writers in SA-TC and SA-NTC in the qualitative analysis. If we find the SA Chinese writers and translators use certain interactive features much more frequently or less frequently than the other

Chinese science writers, these patterns can be regarded as marked choices, and then we can further discuss the potential effects of the markedness on the writer-reader interaction.

3.3.4 Discoursal and Generic Explanations

The last steps locate textual analysis and local pragmatic interpretations in the background of social settings, especially concerning the roles of text producers and receivers in the conventional setting of popular science genres. An important issue that needs to be tackled in this stage is circularity, as pointed out in the review of discourse studies in 2.2.6. A textual-analysis of writer-reader interaction inevitably faces a problem of what textual analyses cannot tell us. In the study of interaction, Myers (1999:56) clearly warns of the shortcomings of textual analysis: "Analyses based on these [textual analyses] models can show that there *is* interaction in these texts, but it cannot tell us what kind of interaction, between what sorts of actors..." In fact, any linguistic research that seeks to go beyond mere description of languages and intends to interpret or even explain languages (such as CDA) cannot escape the criticisms of circularity, from which the present study, of course, cannot be exempted. Circularity means that linguistic analysts infer beliefs from text use and then expediently use the textual analysis to support their interpretations (Widdowson 2004: 128). In other words, very often analysts read into texts only what they want to read. The perspective that analysts bear in mind before they approach texts is termed by Widdowson (ibid.:80) as "pretextual purpose." This pretextual purpose restricts the analysts' attention in texts and controls the direction of interpretation. Regarding this issue, Stubbs (1997) suggested that even though some of the problems of circularity will always remain, there are some support methodologies that can minimize the impact of circularity and partiality of textual analysis: ethnographic study of actual text production, analysis of co-occurring linguistic features, comparison of texts and corpora, and study of dissemination and audience reception (Stubbs 1997:111).

A similar proposal to resolve what textual analyses cannot tell us about interaction by Myers (1999:58-59) also seems to follow a similar line: decontextualization and rematerialization. Decontextualization is similar to the corpus-based approach in the first stage of our analytical procedures: we quantify interaction as being only a bundle

of linguistic features. In this way we can avoid any preconceived or biased perspective when we approach the features. On the other hand, rematerialization aims to reconstruct the context – time, place and process – when the interaction took place. In written mode, it helps if traces of interaction can be recovered from paratextual features, such as layouts of publications, surrounding commentary, statement of editorial policy, etc.

Regarding these issues and suggestions, the present study as a corpus-based investigation effectively seeks to avoid the criticism of focusing on selected samples only. Based on the corpus survey as the first step, i.e. dematerialization, we can avoid the bias of pretextual purposes that focus only on the features that the analyst wants to look at. Also in the qualitative analyses, we discuss not only examples supporting the major trends identified in quantitative studies, but also counter-evidence that is not consistent with the results, in order to cover a wider view of the data. The suggestion of investigating co-occurring linguistic features is also fulfilled in the textual studies. We based the quantitative studies on four selected categories, but bring any relevant linguistic phenomena into the discussion in qualitative textual analysis when longer chunks of texts are sampled. Besides, the present study fulfils the criteria of comparison by involving a parallel corpus and a comparable corpus.

In order to minimize problems of circularity and to take up the suggestion of rematerialization, including an ethnographic approach, study of audience reception, etc., the present study brings in paratextual analysis as a support to textual analysis. Paratext, following the definition of Genette (1997:1), refers to materials accompanying a text. It can be broadly divided into two types: Peritext is materials that are situated around the text, such as book titles, prefaces, illustrations, and blurb. Epitext is distanced materials located outside texts involving interviews with the authors, comments and reviews of books, etc. The importance of paratexts is that they help to reconstruct the communication — location, time, mode, participants, and aims. At a pragmatic level, as Genette (ibid.:8) stresses, paratext provides important information to the situations of communication, such as "the nature of the sender and addressee, the sender's degree of authority and responsibility, the illocutionary force of the sender's message," and many others. Kovala (1996) uses the paratextual

methodology to analyse ideology in translated texts. The study finds that very often paratexts are used as a strategy to bring the texts and the readers closer (ibid.:140). The preface, the blurb, and design of the presentation of texts can all be designed to control the reading of texts. Indeed, the influence of paratexts on readers can come before the influence of textual features. Therefore, it is important to explain the textual analysis against the background of a careful paratextual profile.

For the purpose of the present study, we bring both peritext and epitext materials into our investigation. Peritext evidence is collected from online and paper publications of SA magazines, and it includes basic features, such as the cover, the title, prefaces, text producer's introductions, layout of texts and illustrations, and prefaces. Epitext materials include reviews and comments on the publications, readership analysis of the magazines, and interviews conducted with the chief editor, a translator, and a Chinese writer of the Chinese edition.

We will present an analysis of parallel texts in Chapter 4, with quantitative statistics presented in 4.1 and qualitative analysis in 4.2. Comparable analysis will then be presented in Chapter 5, following the same order of quantitative statistics in 5.1 and qualitative analysis in 5.2. We will bring the results of textual analysis in Chapter 4 and Chapter 5 together in Chapter 6, and locate the textual findings in the background of detailed paratextual analysis, to account for the writer-reader interaction taking place in the actual process of communication.

CHAPTER FOUR
TRANSLATION OF WRITER-READER INTERACTION: FINDINGS IN THE PARALLEL CORPUS

In this chapter the focus is on the first aim of the study: to investigate evidence of writer-reader interaction in the translation of the genre of popular science from English to Chinese. The parallel corpus used for the investigation in this chapter involves SA-E and SA-TC, and also the Chinese reference corpus SC-SCI. The research focus is how the translators deal with interactive features in the source texts when the target readers are of a different background from that of the source text readers. In the first step (quantitative findings, section 4.1), we look for the translation shifts of the selected interactive features in the parallel corpus. In the second step (qualitative analysis, section 4.2), based on the statistical findings of the main trends of translation shifts, we bring the co-text and context into discussion in order to explore the meanings of the quantitative findings. A case study of a longer text unit will be presented in 4.3 to explore how the four interactive features interweave to form a consistent interactive pattern in the translated texts, and how they are different from the interactive pattern in the source texts. A summary of the findings in this chapter and tentative conclusions will be given in section 4.4.

4.1 Quantitative Analysis of the Parallel Corpus

The objective of this section is to compare SA-E and SA-TC and to provide a statistical background to similar or different patterns of the interactive features used by the source text writers and the translators. The findings are presented in the following order: deixis (4.1.1), personal reference (4.1.2), junction (4.1.3) and hedges (4.1.4). Even though the focus is on comparing the parallel corpus, a comparison of SA-TC with SC-SCI provides a very important statistical background, relating to whether the translators' choices are an accommodation to the target norms (hence obligatory or preferred shifts) or can be regarded as a unique feature in the process of translation itself (optional shifts).

4.1.1 Deixis

First, the total numbers of occurrences of demonstratives, time and place adverbs in

SA-E, SA-TC and SC-SCI are presented in table 4.1 below. The English demonstratives contain *this*, *these*, *that*, and *those*; place adverbs are *here* and *there*; and time adverbs are *now* and *then*. The Chinese demonstratives cover 這 zhe, 那 na, their formal alternatives 此 ci, 該 gai, and the classifier phrases based on these four roots; the place adverbs include 這裡 *zheli*, 那裡 *nali*, and their formal alternatives 此地 *cidi*, 該地 *gaidi*; the time adverbs are 這時 *zheshi*, 那時 *nashi*, and more formal 此時 *cishi*, 當時 *dangshi*.

		SA-E	SA-TC	SC-SCI
Proximal	Demonstratives	447	1167	1512
	Place adverbs	88	36	16
	Time adverbs	22	14	14
	Total (% of total word count)	557 (0.54%)	1217 (1.10%)	1542 (0.27%)
Distal	Demonstratives	199	227	337
	Place adverbs	28	5	9
	Time adverbs	28	60	48
	Total (% of total word count)	255 (0.25%)	292 (0.27%)	394 (0.07%)
Total (% of total word count)		812 (0.79%)	1509 (1.37%)	1936 (0.34)

Table 4.1 Instances of deictics in SA-E, SA-TC and SC-SCI

A comparison of SA-E and SA-TC shows that the latter has a higher frequency of deictics than the former. The difference lies especially in the frequencies of proximal deictics, while the frequencies of distal deictics are very similar. This suggests that SA-TC adds a large number of proximals that do not exist in the source texts. In the next step we compare SA-TC and SC-SCI to determine whether the increase of proximals in SA-TC is an accommodation to the Chinese norm, in which case the translators' choices and motivations may be less worthy of discussion because the shifts are either obligatory or preferred in the process of translation. However, the figures suggest that SC-SCI actually has the lowest frequency of deictics among the three corpora in table 4.1. **The translations use a higher frequency of deictics not only than the source texts but also than the Chinese norm.** Therefore, we cannot just explain the use of deictics in SA-TC as being under the influence of source texts or constrained by the target norms. Rather, the translators' choices may be involved

and their motivation and effects are worth further examination.

We further calculate the translation shifts taking place in SA-TC. Table 4.2 below shows a summary of the total number of translation shifts involving deictic demonstratives, and time and place adverbs in SA-TC.

Distancing Shifts			Proximatizing shifts		
ST proximal→ TT distal	ST proximal→ not translated in TT	Add TT distal	ST distal→ TT proximal	ST distal→ not translated in TT	Add TT proximal
10	110	228	72	118	780
348 (26.5% of all deictic shifts)			970 (73.5% of all deictic shifts)		
1318					

Table 4.2 Instances of deictic shifts in SA-TC

Table 4.2 identifies six types of deictic shifts. According to the shifting direction towards distance or proximity, these shifts are further grouped into distancing shifts or proximatizing shifts. Those belonging to the group of distancing shifts are:

(1) ST proximal→TT distal;

(2) ST proximal→not translated in TT;

(3) Add TT distal.

Another three types of translation shifts point towards a reverse direction: proximatizing shifts.

(4) ST distal→TT proximal;

(5) ST distal→not translated in TT;

(6) Add TT proximal.

Through the strategies of replacing a distal by a proximal, not translating a distal, or presenting an extra proximal in the translation, the translation displays a trend of shifting towards proximal deixis.

The six types of translation shifts are based on three main strategies, each with two directions. Thus, types (1) and (4) are shifts between proximals and distals but

pointing towards two opposite directions. Types (2) and (5) both adopt the strategies of omission. Types (3) and (6) add extra deictics in target texts.

A comparison of the two trends of shifts shows that shifts towards proximity (970 instances) occur much more often than shifts toward distance (348 instances). This trend is found to be consistent in the three strategies employed in translation shifts. The number of shifts from ST distal to proximal (72 instances) is higher than the number from ST proximal to TT distal (10 instances). The omission of distals (118 instances) is higher, though with a less significant margin, than that of proximals (110 instances). Also, the number of addition of proximals (780 instances) is higher than the addition of distals (228 instances). This consistency shows a significant predominance of proximatizing shifts rather than distancing shifts.

Another interesting finding from table 4.2 is that among the three strategies adopted in translation shifts, the strategy of addition is higher than the other two strategies and it is true in both directions — addition of both proximals and distals. This high number of additions can explain why in table 4.1 the number of deictics is much higher than in the source text. Following the pragmatic definition (see 2.5.1) of deixis as an anchoring of interaction, this higher frequency of deictics in SA-TC than in SA-E and SC-SCI may be an important indication of the translators' interaction with the target readers.

In summary, there are two important findings from this section: (1) the occurrences of shifts towards proximity are higher than those of the reverse direction. A more salient use of proximals seems to be the feature in SA-TC. (2) The number of deictics in the translation is higher than the number in SA-E and also in SC-SCI. We can thus hypothesize that the high frequency use of deictics is a feature emerging from the process of translation itself — not merely from the influence of the ST and certainly not an accommodation to the Chinese norm. A qualitative analysis of these two findings will be discussed in section 4.2.

4.1.2 Personal Reference

This section presents the quantitative statistics of personal reference in the parallel

corpus SA-E and SA-TC. The categories investigated here are the explicit revelations of writer and reader: first and second personal reference. 1PS stands for first person singular, and 1PP for first person plural. 2P stands for both singular and plural in English and Chinese[46]. A specific account of the components of each category can be found in table 2.3 and 2.4 in 2.5.2.

We first present the total number of personal references in SA-E and SA-TC. SC-SCI, representing the norm in Chinese science texts, is also placed beside SA-TC as a reference corpus. The percentage alongside the raw number of occurrences indicates how frequently that category of personal reference occurs in the entire corpus.

	SA-E (% of total word count)	SA-TC	SC-SCI
1PS	542 (0.53%)	448 (0.41%)	670 (0.12%)
1PP	361 (0.35%)	368 (0.33%)	469 (0.08%)
2P	208 (0.20%)	152 (0.13%)	288 (0.05%)
Total	1111 (1.18%)	968 (0.88%)	1327 (0.23%)

Table 4.3 Instances of personal reference in SA-E, SA-TC and SC-SCI

Overall, SA-TC uses less personal reference than SA-E. The difference is more obvious in 1PS and 2P. In 1PP the differences are not very obvious, and the raw figure in SA-TC is even slightly higher than in SA-E. Compared with the larger difference between ST and TT observed in deixis (in 4.1.1), this table might suggest that there is not very much to be investigated. In 1PP in particular, the numbers in ST and TT are almost identical.

However, a comparison of SA-TC and SC-SCI will lead to an interesting observation: **the frequencies of personal reference in the translations are significantly higher than in the original Chinese writing**. As discussed in 2.5.2, comparative linguists

[46] Since both singular and plural second person pronouns refer to the addressee(s), in this study we do not make any distinction between the numbers. Hence, whether an English *you* is translated as *ni* (singular) or *nimen* (plural) it will be counted as a non-shift in the quantitative findings.

(Li and Thompson 1981:657) have found that the Chinese language generally uses less personal reference than in English because Chinese writers tend to omit references that are understandable from the context, but our findings here suggest that the translation accommodates to the source text and moves away from the TT norm. The translations may still have received some influence from the target language by omitting a number of personal references, but the influence from the ST is even greater. Therefore, in this table we find that the frequency of personal references in SA-E is slightly higher than in SA-TC, and both are much higher than SC-SCI.

Table 4.4 presents the number of additions and omissions and their percentage of total count of translation shifts (i.e. the sum of addition and omission).

	addition	omission
1PS	22 (16%)	116 (84%)
1PP	107 (52%)	100 (48%)
2P	25 (24%)	81 (76%)

Table 4.4 Shifts and percentage of personal references in SA-TC

Column 1 presents the number of instances in which the translation adds additional personal references that do not exist in the ST. For example,

(1) (ST) caution is warranted→(TT) we need to be cautious

Examples include the cases when the writer shifts from third person to first person or second person, and therefore are counted as addition, as illustrated in (2).

(2) (ST) she→(TT) my mother

Column 2 counts the omission of personal references in ST, as in (3)

(3)(ST) she was just jealous, I thought→(TT) she was just jealous

As in the case of addition, the occasions may also include shifts from first or second person perspective to third person perspective, and counted as omission here.

There are also two instances of shifts from 2P to 1PP. The cases are counted as

omission in 2P and addition in 1PP.

(4) (ST) if <u>you</u> just accept it→(TT) if <u>we</u> just accept it

The analysis of shifts here reminds us that although on the surface the numbers in SA-E and SA-TC do not differ greatly, the components of 1PS; 1PP and 2S actually differ considerably. In 1PP in particular, despite the similar raw figures of their frequencies in SA-E (361) and SA-TC (368), 107 instances are added in the translation and 100 ST instances are omitted. These shifts suggest that the use of 1PP in the TT is very different from that in the ST, and 1PP may be used in the translation to play different functions for different purposes. 1PS and 2P have fewer additions but the number of omissions has also accounted for a large proportion of instances in the source text. The reason and effect behind these shifts will be examined more closely in 4.2.2.

In this section we have two observations: (1) the translation uses a similar number of personal references as the source text, and this is evidence of deviation from the norm of Chinese. This high frequency of first and second references may be regarded as a new interactive pattern introduced via translations from English texts. (2) Regardless of the similar total number of personal references in SA-E and SA-TC, many shifts have actually taken place and may suggest different components - and function, purposes, or effects of personal references - in the translation. The two observations will be the subject of 4.2.2.

4.1.3 Junction

A quantitative analysis of junction is more complicated than deixis and personal reference because the number of junctives is larger and the equivalence between a Chinese and English junctive is less straightforward. Junctions, though considered as function words in a closed set, still contain items that are impossible to include in the investigation — for example, phrases can also perform junctive functions. The junctives in Chinese are even more complicated than in English. In the Academia Sinica Corpus there are approximately 193 different junctives, whereas in BNC there are only 50[47]. Another difficulty is that the equivalence between Chinese and English

[47] The English figures are obtained by counting all the words tagged with *conj* in the BNC word list (http://ucrel.lancs.ac.uk/bncfreq/lists/1_1_all_alpha.txt. Last accessed on 13 May 2008). The Chinese

junctives is not as simple as equivalence in personal reference (Wo=I, me, mine; Ni, Nimen=you, etc.). The imbalance in numbers of junctives between the junctions already suggests that one English junctive can have many kinds of Chinese translations. Our methods of dealing with these two problems are as below.

First, we select only representative junctions in the corpus. Representativeness is decided by frequency in the large general corpus and in the SA corpus. The procedure is first to extract the most frequent lists of junction in BNC (for English) and Sinica (for Chinese)[48]. These junctives are then categorized into different semantic groups: additive, alternative, adversative, causal, hypothetical and temporal. The categories are based on the study carried out by Halliday and Hasan (1976: 242-243), but also include hypotheticals[49] (such as *if*) which do not fit into any of the four categories proposed by them, and separate additive and alternative[50], both of which are categorised under the heading of additive in Halliday and Hasan (ibid.).

Second, translation shifts are calculated in two steps. In the list of representative English junctions, junctions omitted in Chinese translations are calculated. Then in the list of representative Chinese junctives, junctives that are not relayed from the English translations but added by the translations are calculated. For example, *because* may be translated into the less commonly used causal junctive 因之 *yinzhi* in Chinese. In this case, it will be counted as a non-omission in the English list (table 4.5), but it will not be included in the Chinese list (table 4.6).

It should be stressed that the analysis here does not aim to cover all the junctives or

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figures count all the words with *ca* and *cb* tags in the CD-Rom *World List With Accumulated Word Frequency in Sinica Corpus 3.1*, which we purchased from the Academia Sinica.

[48] See table 1 and table 2 in Appendix B. In English the top ten junctions are investigated. In Chinese the list is longer because the top ten junctives are mostly additive junctions. The final list of Chinese junctions to be investigated is based on table 2, but because additive junctions are the majority in the list, some junctions in other semantic categories are added. *Deng*, meaning *so on* or *etc.* is not included in the investigation because this type of junctive is not included in the English list, so an inclusion of *deng* would result in incomparability between the two lists.

[49] The necessity of including the category of hypothetical is also noted in Smith and Frawley (1983: 363).

[50] The reason for separate additive and alternative in this study is that they display different patterns of translation shifts in the quantitative studies, especially in the frequency of omission — additive has 27% whereas alternative has 41%. Also, in the qualitative analysis (4.2.3), there are observations of shifts from alternatives to additives. Therefore, for a clearer account of the junctive shifts taking place in the translation it is regarded as necessary to separate the two types of junction.

every junctive shift in the translation, which would be a task of great technical difficulty. The purpose is to point out a general trend of the use of key junctives taking place in the corpus and provide a direction for further in-depth analysis in 4.2.3.

Table 4.5 shows statistics of translation shifts generated from the corpus based from the two principles.

Types of junction	**Key junctives and total occurrences**				**Total occurrences (and % of omission in total occurences)**
Additive	**and**				
total	1923				1923
Omission	503				503(27%)*
Alternative	**or**				
total	384				384
omission	156				156(41%)
Adversative	**but**	**however**	**though**	**although**	
total	382	44	29	22	477
omission	46	2	3	4	55(12%)
Causal	**because**	**so**	**therefore**		
total	136	70	14		220
omission	10	4	3		17(16%)
Hypothetical	**if**				
total	151				151
omission	14				14(9%)
Temporal	**when**				
total	170				170
omission	99				99(58%)

Table 4.5 Junctives in SA-E and omission in the translation.

Table 4.5 shows that the key temporal, additive and alternative junctives have the highest percentage of omission. This high frequency of omission may suggest that the translators feel it to be less important to mark these three junctive relationships explicitly. On the other hand, the key hypothetical, adversative and causal junctives have a relatively lower percentage of omissions. This suggests that the translators tend

to maintain the explicit junctive markers in these three categories to make the relationship explicit.

Table 4.6 shows the representative junctions in the Chinese translations and the frequency of junctions added by the translators.

Types of Junction	**Key Junctives and occurrences**							**Total occurrences (% of addition in total occurences)**
Additive	與 **yu**	和 **han**	而 **er**	及 **ji**	並 **bing**	以及 **yiji**	而且 **erqie**	
total	355	227	160	139	137	109	76	1203
addition	10	6	27	7	14	4	6	74(6%)
Alternative	或 **huo**	或是 **huoshi**	或者 **huozhe**					
total	190	56	14					260
addition	23	4	2					29(11%)
Adversative	但 **dan**	不過 **buguo**	但是 **danshi**	雖然 **suiran**	然而 **raner**	可是 **keshi**		
total	261	127	101	64	44	20		617
addition	64	17	15	9	6	8		119(24%)
Causal	因爲 **yinwei**	因此 **yinci**	所以 **suoyi**	由於 **youyu**	因 **yin**			
total	133	104	52	49	31			369
addition	60	38	15	23	26			162(44%)
Hypothetical	如果 **ruguo**	的話 **dehua**	若 **ruo**					
total	133	23	15					171
addition	48	10	4					62(34%)
Temporal	當 **dang**	的時候 **deshihou**						
total	74	13						87
addition	16	3						19(22%)

Table 4.6 Junctives in SA-TC and addition in the translations.

Table 4.6 shows that the highest frequency of addition is found in causal, hypothetical and adversative groups, which are also the three groups with the lowest frequency of omission, as shown in table 4.5. The findings here again suggest that the translators tend to mark these three junctive relationships more explicitly than in English. Adversative, alternative and temporal groups, on the other hand, have a lower frequency of addition (and coincidentally also a higher frequency of omission). Again, this can indicate that these three relationships are present with less explicitness into translations than in English.

To make the comparison clearer, the following table presents only the figures of addition and omission.

	Additive	Alternative	**Adversative**	**Causal**	**Hypothetical**	Temporal
addition	6%	11%	**24%**	**44%**	**34%**	22%
omission	27%	41%	**12%**	**16%**	**9%**	58%

Table 4.7 Comparison of addition and omission of junctions in SA-TC.

Table 4.7 shows that adversative, causal and hypothetical groups all have a higher percentage of addition than omission, whereas additive, alternative and temporal have a higher percentage of omission and addition. To demonstrate the significance of these two trends, it is necessary to bring into consideration the norms of Chinese junctions. The question is whether Chinese uses more junctions or fewer junctions than English. With the answer in mind, it is then possible to proceed to decide which trend — omissions or additions — is marked, involving the translator's strategy, and which trend is unmarked, constrained mainly by the linguistic norms.

The literature review of junction (see 2.5.3) indicated that Chinese tends to indicate junctive relationships through lexical meanings, whereas English prefers to use

explicit junctive markers[51]. Relating this finding to the statistics of this study, an important conclusion can be drawn: translators' choices to omit the number of additive, alternative and temporal junctives are unmarked because the shifts are an accommodation to the Chinese norm. By contrast, the translators' choices to shift towards addition of adversative, causal and hypothetical junction are marked because the trend of addition breaks the Chinese norm. Therefore, the trend of addition deserves greater attention because translators' motivation and interactivity in texts may be involved. The motivation of translators and the effects between SA-E and SA-TC will be the subject of the qualitative analysis in 4.2.3.

4.1.4 Hedges

A thorough investigation of hedges in the corpus poses difficulty because there is no strict definition of what surface linguistic features constitute a hedging expression. A hedge can be a word, a phrase, or a sentence structure. It is impossible to achieve a complete survey of all the hedging expressions in the texts. Nevertheless, the aim here is to try to identify trends of the most frequently used hedges in the corpus. What must be done before conducting the analysis is to identify and select the hedges to be investigated.

The English hedges are approached through the following procedures: in the first step the selection is limited to lexical hedges, i.e. modal verbs, lexical verbs, adverbs, adjectives and nouns, and excludes tense, questions, voice, sentence structure, etc. Lexical hedges do not account for the whole picture of hedging in the texts, but they are often the most prominent hedging devices noticed by the readers (Hyland 1994). The lexical devices investigated in literature on hedges (e.g. Myers 1989; Hyland 1998; Varttala 1999) are used as a guideline. A list of the hedges investigated in this study can be referred to in table 3 in Appendix B. We count the raw frequencies of this list of 85 hedges and select the ten with the highest frequency.

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[51] Yip and Rimmington (2004:345) illustrate this statement by a common expression in Chinese: 時間不早了，咱們走吧 (time not early, let's go), meaning "As time is getting on, let's go." The linking between the two clauses is only achieved through 'early' in the first clause and 'go' in the second. Certainly both Chinese and English can choose to make cohesion explicit or implicit, but implicit cohesion seems to be more often used in Chinese than in English.

As there is a lack of comprehensive study on hedges in Chinese, we based the list of Chinese hedges on the corresponding Chinese words that are translated from the ten selected English hedges. Then, based on our intuition of native speakers, we checked the list against samples of non-translated Chinese texts in the corpus to establish whether there are any commonly used Chinese hedges missing in the list. The final list used for the investigation in the present study can be referred to in table 4 in Appendix B. Then, based on the literature of Chinese modality (e.g. CKIP 1993; Hsieh 2005), we excluded those not typically regarded as hedges in Chinese: for example, the Chinese modal verbs *keyi, neng,* and *hui* are mostly translations from English modal verbs *would* and *could*, which, though having high frequency in the list, are typically regarded as an indication of deontic modality in the literature. So eventually a list of nine Chinese hedges was selected to be investigated in this study, as shown in table 4.9.

Based on the English list, we count shifts of omission in Table 4.8.

Key Hedges	Total occurrences	Number of omission	Percentage of omission in the total occurrences
could[52]	240	39	16.25%
would	214	17	7.94%
may	100	10	10%
might	81	4	4.93%
about	75	16	21.33%
perhaps	40	7	17.5%
seem[53]	40	2	5%
often	31	1	3.2%
possible	26	1	3.85%
almost	27	3	11.11%
Total	845	100	11.83%

Table 4.8 Omission of hedges in SA-TC

[52] The three English modal verbs (could, would and may) in the list are translated into different Chinese modal verbs; some may be considered to express stronger certainty than the source text, such as *keyi* (can) and, *hui* (will). The degree of certainty indicated by the modal verbs in the source text is difficult to define clearly and is largely dependent on the translator's own understanding and interpretations of the source text. Like the English modal verbs, these Chinese modal verbs also bear multiple functions and it is difficult to consider whether a shift of degree of certainty occurs or not. Therefore, in this section the translation into any modal verbs regardless of the degree of possibility is counted as a non-shift.

[53] The verbs listed here stand for the lemma.

Table 4.8 shows that shifts from hedges to non-hedges is not significant in several hedges: *seem, often,* and *possible,* for example, have only one or two shifts. The three modal verbs *could, would* and *may* are the hedging devices most often used by the writers, and their relative higher percentage of omission than others (except *about*) may also be related to their larger number of occurrences. The hedge that has the highest percentage of omission is *about*, which co-occurs mostly with numbers and figures in the English source texts. Nevertheless, overall, compared with the other interactive features, the shift of omission occurring in hedges is less significant in terms of the quantitative statistics.

For the reverse direction, we investigate the list of Chinese hedges and count the occurrences of those added by the translators (Table 4.9).

Key Hedges	Total occurrences	Number of addition	% of addition in total occurrences
可能 *keneng* [possibly]	230	10	4.34%
約 *yue* [about]	43	5	11.62%
也許 *yexu* [maybe]	38	1	2.63%
幾乎 *jihu* [almost]	37	3	4.11%
或許 *huoxu* [maybe]	36	1	2.78%
似乎 *sihu* [seem]	32	1	3.13%
大約 *dayue* [about]	28	4	14.29%
看來 *kanlai* [appear]	24	2	8.33%
大概 *dagai* [roughly]	18	1	5.56%
Total	496	28	5.65%

Table 4.9 Addition of hedges in SA-TC

The percentage of addition of hedges is even smaller than that of the omission. Four out of the nine items in this table have only one instance of addition. The others also have a small number of additions. The one with the highest number of additions is *keneng*, with the most frequently occurring hedges in this corpus, but the percentage is still low (4.34%). In terms of the percentage, *yue* and *dayue*, both meaning *about,* have the highest percentage of occurrences added in the target text (*yue* 11% and *dayue* 14%). It is an interesting finding that *about* has the highest frequency of both addition and omission, and in both directions *about* often occurs with numbers. The

finding may suggest that the translators depart from the writers of the source texts mostly on the occasions of modifying figures rather than on a larger proposition.

As pointed out at the beginning, the number of shifts in the translation of hedges is relatively insignificant in comparison with the other three interactive features as both the percentages of addition and omission are relatively small. This suggests that in terms of the use of hedges the translators tend to follow the source text and do not make many shifts when facing the target readers. A comparison of the pattern of hedges in SA-TC with the Chinese norm (Table 4.10) may inspire more thoughts on the translators' strategy.

Key Hedges	SA-TC	% of total word count	SC-SCI	% of total word count
可能 *keneng* [possibly]	230	0.21%	241	0.04%
約 *yue* [about]	43	0.03%	63	0.01%
也許 *yexu* [maybe]	38	0.03%	34	0.006%
幾乎 *jihu* [almost]	37	0.03%	52	0.01%
或許 *huoxu* [maybe]	36	0.03%	34	0.006%
似乎 *sihu* [seem]	32	0.03%	39	0.007%
大約 *dayue* [about]	28	0.03%	15	0.003%
看來 *kanlai* [appear]	24	0.02%	6	0.001%
大概 *dagai* [roughly]	18	0.02%	15	0.003%
Total	496	0.45%	499	0.09%

Table 4.10 A comparison of key hedges in SA-TC and SC-SCI

A comparison of SA-TC with SC-SCI in table 4.10 shows that the translation uses a much higher frequency of hedges than may be found in the Chinese norm. This finding suggests that the trend in the translations to maintain a similar number of hedges as in the English source text may also need to be regarded as a marked choice, as it is a departure from the norm in the target language. The frequency of hedges in the translations may further suggest a different interactive strategy adopted by the writer towards the readers from that in the Chinese norm.

In conclusion, it was found that the trends of omission and addition of hedges are not as statistically significant as are the other three interactive parameters. The figures may suggest that the translators do not differ much in terms of the strategy of using

hedging devices from what the source writers do. Nevertheless, a further comparison between SA-TC and SC-SCI suggests that the former uses a much higher frequency of hedges than the latter does. Therefore, the fact that the translations have few shifts from the source texts and maintain a similar high percentage of hedges can be regarded as a marked phenomenon because it suggests a departure from the norm in the target system. From this perspective, the translators' choice of using this interactive device may still be involved and will be further investigated in the qualitative analysis in 4.2.4.

4.2 Qualitative Analysis of the Parallel Corpus

The quantitative analysis in section 4.1 shows a number of significant shifts taking place in the process of translation, and based on the direction of trends identified in 4.1, in this section we will examine translation shifts in their context and co-text and aim for a more in-depth analysis to explore their relevance to writer-reader interaction. The discussion will focus on the main trends of shifts identified in section 4.1, but instances of non-shifts and counter-examples to the main trends of shifts will also be brought into discussion because, by contrasting the main shifts to the counter examples, the translators' choices can be more clearly revealed, and the existence of counter-examples proves that alternative strategies are possible and the shifts identified are not obligatory.

4.2.1 Deixis

In 4.1.1 the frequencies of deixis in the corpora and the instances of translation shifts are investigated. The numerical evidence suggests that there is a trend in the translation to shift towards proximal deixis. In this section a more in-depth contextualized analysis will be conducted in order to explore the translator's motivation and intention, if any, behind the trend of shifts and its pragmatic effects as a whole for writer-reader interaction.

4.2.1.1 Deictic Shifts towards Proximity

The addition of proximals is the largest trend in the corpus. The addition of deictics presents an unusual phenomenon because the statistics show that the average frequency of deictics in the reference corpus SC-SCI (0.34%) is lower than that in

SATC (1.38%). This means that the translations add a significant number of deictics in the translation which do not exist in the ST, and which does not seem to be an accommodation to the norm of the target language. This unusual strategy catches our attention and we are particularly interested in the pragmatic concerns behind these choices.

First, an examination will be made of one example of addition of proximal deictics in the corpus. This is the first paragraph from the article *The Mystery of the Voynich Manuscript*, in which the writer tries to solve the myth of the Voynich manuscript and actually identify it as being a hoax.

Example 4.1

(ST) In 1912 Wilfrid Voynich, an American rare-book dealer, made the find of a lifetime in the library of a Jesuit college near Rome: a manuscript some 230 pages long, written in an unusual script and richly illustrated with bizarre images of plants, heavenly spheres and bathing women. Voynich immediately recognized the importance of his new acquisition. Although it superficially resembled the handbook of a medieval alchemist or herbalist, the manuscript appeared to be written entirely in code. Features in the illustrations, such as hairstyles, suggested that the book was produced sometime between 1470 and 1500, and a 17th-century letter accompanying the manuscript stated that it had been purchased by Rudolph II, the Holy Roman Emperor, in 1586. During the 1600s, at least two scholars apparently tried to decipher the manuscript, and then it disappeared for nearly 250 years until Voynich unearthed it (Rugg, July 2004).

(TT) 1912 年，美國珍本書商伏尼契（Wilfrid Voynich）在羅馬附近一所耶穌會大學圖書館，找到他一生中最大的發現：一份厚達 230 多頁，以奇特字體寫成的手稿，手稿中還有許多植物、天體和出浴美女等奇異的圖片。伏尼契立刻認定這是極爲重要的新發現。這份手稿雖然看來像是中世紀鍊金術士或草藥醫生的參考書，但似乎完全以密碼寫成。從插圖中的髮型等特徵看來，這本書的製作時間應該介於 1470~1500 年間，手稿上的 17 世紀字母說明，這份手稿在 1586 年由神聖羅馬帝國的魯道夫二世收購。1600 年代，至少有兩位學者曾試圖解讀這份手稿，後來它消失了將近 250 年，直到伏尼契發現才重見天日。(Gan, August 2004)

(BT) In 1912, American rare book dealer Voynich found in a Jesuit college library near Rome his biggest discovery in lifetime: a manuscript as thick as 230 pages and written in unusual font, script also has many unique pictures of things such as plants, heavenly spheres and bathing beauties. Voynich immediately regarded this extremely important new discovery. This manuscript although looks like a reference book of a medieval alchemist or herbalist, but seems to have been written entirely in code. Judging from the features such as the hairstyles in the illustrations, the time when this book was produced would have been between 1470 and 1500, manuscript's 17th century letter indicates that, this manuscript was purchased in 1586 by Rudolph II of the Holy Roman Empire. During the 1600s, at least two scholars tried to decipher this manuscript, then it disappeared for nearly 250 years until Voynich found [it] and [it] saw daylight again.

This short paragraph contains a dense repetition of reference to the Voynich manuscript, as underlined. In ST the references are established through the definite articles *the*, indefinite articles *a*, indefinite pronoun *it*, and also the cohesive lexicons *book* and *manuscript*. No demonstratives regarding the proximity or distance are found. However, in the translation, we find this co-reference is largely established through the proximal demonstratives *zhe*, a few in zero-form (bare noun phrases), a third person non-human pronoun *ta*, and the uses of *book* and *manuscript* are relayed as such. The pattern can be more clearly shown inTable 4.11 below:

ST	TT
the find of a life time	his biggest discovery in lifetime
a manuscript	a manuscript
Ø	script
his new acquisition	**this**
it	**this** manuscript
the manuscript	**this** book
the book	manuscript
the manuscript	**this** manuscript
it	**this** manuscript
the manuscript	it
it	it
it	Ø

Table 4.11 Deictic shifts in example 4.1

The translation has five shifts from neutral to proximal demonstratives, and it is obviously distinguished from the English text in its shifting towards proximity. A series of questions immediately follow: what is the function of these proximal demonstratives, why do the shifts occur, and are the translator's choices involved?

First, the function of these deictics is anaphoric or co-referential, "pick[ing] out as referent the same entity (or class of objects) that some prior term in the discourse picked out" (Levinson 1983:67). The paragraph is focused on one topic: the manuscript, and the translator uses different strategies, mainly repetitive noun phrases modified by proximal demonstratives, to maintain the co-reference. The question follows: why do the translations shift towards proximal demonstratives. Are these optional, preferred, or obligatory shifts[54]?

In this example, the translation of *the* into Chinese particularly presents a problem in terms of the grammar. According to Halliday and Hasan (1976:38), English demonstratives can be divided into selective and non-selective (similar to the division of marked/unmarked[55]) categories — the deictics *this, these, that, those* are selective, whereas *the* is a non-selective modifier and *it* is a non-selective head. The Chinese language does not have the non-selective counterparts of *the* on the surface structure. Consequently, the shifts from *the* to marked deictic demonstratives seem inevitable. However, Chinese linguists have generally taken the zero form as the unmarked form in contrast to the marked *zhe* and *na* (Xu 1987). Furthermore, on some occasions, the distal *na,* if not stressed when pronounced, can function as the neutral and non-deictic article *the* in English (Li and Thompson 1981:131-2).

Therefore, the translator is actually presented with three choices when translating *the*: the proximal demonstrative, the distal demonstrative, or non-rendering (i.e. zero demonstrative). As we have argued, the zero form is the unmarked choice in Chinese, and indeed in the corpus we find that most definite articles have not been translated, which is considered to be the unmarked choice. But we also find that those translated

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[54] Definition of the three types of shifts is discussed in 3.3.3.
[55] Distinction between marked and unmarked is referred to in 3.3.3.

as deictics usually shift from neutral to proximal rather than distal. This seems unusual, since the distal demonstrative is usually less specific — in English *it* does not have a particular reference point as *this* does, and we have mentioned that in Chinese *na* can sometimes function as a neutral demonstrative, with unstressed pronunciation. Preference of proximals here can be regarded as marked. However, another issue must be brought into the discussion: the difference in anaphoric preference in English and Chinese deictics. A large percentage of definite articles in English serve an anaphoric function. In Chinese the choice of a proximal may be a preference in anaphoric uses.

This is a question that has been widely discussed in English, and in many contrastive linguistic studies. In English, it has been generally agreed that *this* refers to the coming utterance whereas *that* refers back (Levinson 1983:85; Toolan 1990:183). Chinese, on the other hand, has a different tendency. *Zhe* is preferred in referring back (Zhu *et al.* 2001:32). However, most of the previous studies emphasize that these distinctions both in English and in Chinese are tendencies rather than rules. For example, generic features can be a factor — in English, distals may be preferred in narratives such as children's stories and ballads, whereas proximals may be preferred in a more conversational-style narrative to construct solidarity and share mutual interests (Halliday and Hasan 1976:61). Modes of discourse can also display different tendencies. For example, Tao (1990:82) in his spoken Mandarin corpus found that *na* is used slightly more than *zhe* as an anaphoric deictic. Moreover, the grammar guide in Mandarin normally does not differentiate between the function of both *zhe* and *na*, and presents them both as being viable in anaphoric use (Lü 1999:397, 657; Zhao 1999:27).

The discussion of this preferred trend of English and Chinese textual deictics leads to the conclusion that a shift towards proximal of anaphoric functions, as in example 4.1, should be regarded as a preferred but not obligatory shift. As we have said, more than one option is available to the translator and the translator actually still has freedom to opt for a pronoun or a zero referent. The following examples (such as example 4.4) will show that the translator does not make every anaphoric referent shift towards proximity. This makes one wonder what the reason might be for the translator to make

shifts towards proximity.

The proximal demonstratives may be used more often here because of the factor of "assumed familiarity" (Prince 1981)[56]. Tao (1990) follows a similar taxonomy of degrees of assumed familiarity and finds that in Chinese proximals are more often used to introduce new and non-identifiable reference, whereas *na* is used to introduce new but identifiable reference. That is, when the writer is going to introduce a new term in his article, he will first make an assumption about the readers' knowledge of this topic. If it is first mentioned in this article but he assumes that the reader will be able to relate the referent to a certain part of his knowledge, then he tends to choose the distal. On the other hand, if the referent is considered to be totally unfamiliar to the reader and is not related to any part of their past discoursal experience, then the proximal reference is likely to be selected.

The assumption of familiarity of the source text readers and target readers can be very different. The source texts are written by American writers mainly within the American context; for example, the ST may use some current issues in American society as a way to interact with the American readers. Responding to this different assumed familiarity, the translator has to make some adjustments. In example 4.1, the Voynich script may be considered by the translator to be less familiar to the target readers and needs to be introduced as a new and non-identifiable issue. Actually, the high use of proximal reference to the manuscript is more salient in this first paragraph of the article and then the translator gradually opts for the unmarked form. It is assumed that as the readers proceed, the referent will gradually be built into their knowledge and become familiar to them.

Also, demonstratives play an important part in maintaining the cohesion of the text. In popular science, it is important to specify the relations in the continuous discussion of the same referent, as in example 4.1. As Myers (1991:9) suggests:

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[56] In this taxonomy, Prince (1981: 233-237) defines three main types of assumed familiarity. An entity first introduced into the discourse is regarded as NEW. Something that has already existed in the discourse is EVOKED. If an entity is new in the discourse but the speaker assumes the listeners can infer it based on other evoked entities, it is regarded as INFERABLE.

> when the same entity is seen from different points of view, so that a confused reader might think there were two different entities, the connection between these two forms in often signaled by a demonstrative (...), by a definite article, or by repetition of a modifier.

When a concept or an item is under discussion - definitions given, discussions from different angles provided, conclusions suggested, etc. - it is common to signal their connections by a demonstrative.

The writer's intention to make cohesion explicit can also be demonstrated by the fact that the addition of *zhe* often co-occurs with the strategy of adding extra transition clauses, as in example 4.2.

Example 4.2

(ST) ...annual outlays for maintenance, repairs and operations far exceed total hardware and software costs, for both individuals and corporations.

Our group of research collaborators at Stanford University and the University of California at Berkeley has taken a new tack, by accepting that computer failure and human operator error are facts of life.... (Fox and Patterson, June 2003).

(TT)...不論是個人還是公司，每年花費在電腦維修與運作上的支出，都遠高於軟體與硬體的總成本。對於這個問題，如今有了新的解決方法。

我們研究小組的成員，分別來自美國史丹佛大學與加州大學柏克萊分校。我們採取一種新的方針，把電腦故障與操作者的疏失，全都視爲生命中必然會發生的事實。(Zhong, July 2003)

(BT) Whether individuals or companies, every year the spending on computer repair and operation is far higher than the total software and hardware cost. Regarding this problem, now new resolution is available.

Our members of research team are respectively from Stanford University and the University of California at Berkley in USA. We adopt a new approach by regarding computer failure and operator failure as facts that are inevitable in life.

In this example a transition sentence is inserted at the end of the preceding segment. The translator provides a clear link between the two paragraphs for the target readers.

The transition sentence points out the macro-structure of the textual organization, a problem-solution structure (*cf.* Hoey 1983), and makes the readers anticipate that a response to the problem will be given in the next paragraph. The proximal demonstrative in the transition sentence refers back to the extended description of the problem in the previous paragraph.

Myers (1991:15) describes this knowledge of "discourse segments", i.e. the ability to anticipate the macro-structure of textual organization, as a distinction between lay readers of science texts and those with expertise. Here, we can compare the Chinese readers as lay people and English readers as experienced readers of this magazine. In other words, we can hypothesize that the *Scientific American* has been published in US for long enough to assume that most of the readers are accustomed to the conventional narrative and argumentative structures in the magazine, whereas the Chinese translators and writers do not have the confidence to make such an assumption about their target readers. Because of the long history of the publication of *SA* in USA, the writing has become a well-recognized genre and it may be suggested that its readers have gradually developed the ability to identify "intertextuality" in the text — they can "make the utilization of one text dependent upon knowledge of one or more previously encountered texts" (Beaugrande and Dressler 1981:10).

A reader familiar with this genre will instinctively anticipate that the researcher will propose a solution and explain how the experiment is conducted. If this is an article written by a popular science journalist, the plot may be different and an experienced reader of the magazine would form a different anticipation.

The addition of this transition phrase provides evidence of the translator's consideration of the readers; regardless of the actual ability of the readers to infer discourse structure, the translator or perhaps the editor feels that extra cohesive devices may be helpful for the target readers.

The above examples contained texts aiming to explain and introduce new scientific concepts, and they use many textual and endophoric deictics. There are also other texts that resemble more a news report written by a journalist who is not or does not

present himself as a scientific expert. The main purpose of the text is not to explain difficult scientific research but to narrate an interesting scientific event.

Waiting for Liftoff is an example of this type of article. The author of this article is not a researcher who conducts scientific activity. Rather, he reports his first-hand experience as a journalist in attending the lift-off of an exploration rover. Examples of deictic shifts identified in this article are presented in table 4.12.

	ST	TT	BT
1	…and a space junkie keeps blocking my view as he bobs up to check the tripod on his huge telephoto camera.	…而前頭有個太空迷不時調整他那架大型遠距相機的三角架，把我的視野給擋住。	…and a space junkie in the front keeps checking tripod on his that huge telephoto camera, and blocks my view.
2	And even if the payload includes no astronauts, just a large robotic rover.	或者，即使這次火箭裡並沒有乘載太空人，只有一部大型的漫遊機器人。	…or, even this time payload does not carry astronauts, just a large robotic rover.
3	Under the moonless, cloud-covered sky, the star shines from the crowd…	這個沒有月亮、烏雲滿佈的夜晚，人群中卻出現點點星光…	In this night without moon and covered with cloud, dots of stars shine from the crowd…
4	…because this rover is going all the way to Mars, where it will join an identical twin launched earlier in June.	…因爲巡迴者號的目標是遙遠的火星，在那兒加入 6 月時所發射的同型探測船。	…because the destination of Mars Exploration Rovers is Mars far away, and there it will join an identical exploration rovers launched in June.
5	…the robot will search for clues about the watery past of that desert world.	…巡迴者號將尋找這個荒蕪世界過去是否有水存在的線索。	…Mars Exploration Rover will search for whether this desert world has any clues of water existing in past.
6	The controllers abort and try for a second shot, at 12:37 A.M.	控制人員宣佈放棄這次升空，改到午夜 12 點 37 分再試第二次。	…controllers announce to abort this instance of liftoff, and changes to 12:37 midnight to try a second shot.
7	Departure is set back another week—a week I don't happen to have time.	出發日期又延後一個星期，但那時我剛好沒有空。	…date of departure is delayed for a week, but at that time I don't happen to have time.
8	The space junkie is back, this time with a telescope.	那位太空迷又回來了，這回還帶了一台望遠鏡。	That space junkie is back, this time with a telescope.

Table 4.12 Deictic shifts in *Waiting for Liftoff*

(ST: Gibbs, November 2003; TT: Guo, December 2003)

Most of the deictic demonstratives in this example refer exophorically to the scene rather than being textual-oriented, and we find in the translation that the deictic expressions occur more often than in the source text. A high frequency of deictics in a text is generally regarded as "a symptom of a much more intense engagement with the action and visualization of it" (Furrow 1988:368). The translator uses *this time*, *this night*, *this instance of liftoff*, which relates the time he wrote this article to the time the lift-off actually happened. The proximal deictics increase "immediacy and cyclicity" (Toolan 1990:179) in the text and also invite the readers to use their imagination and join the writer at the scene. The translation adds a few distal demonstratives as well, which has the effect of helping to sharpen a vivid spatial-temporal configuration, so that the readers can imagine that the writer sees *that space junkie*, *that telescope, that time*, etc., some distance away from the writer from his point of view. Through the specification of what is near and what is far from the utterance of context, the writer provides a "window" or "vantage point" (Simpson 1993:15) for the readers, and the narration becomes more vivid as if the readers are watching a live broadcast of the lift-off.

In Row 5 in Table 4.12, there is a shift from distal to proximal; the referent involved is Mars, a deserted planet far away in space. The source writer uses *that desert world*, which seems to be the unmarked choice on this occasion because *desert* and *past* in this clause both suggest a distance from the context of utterance. By contrast, the translation shifts towards proximity by using *this desert world.* In this instance the translator can follow the source text for the distal demonstrative, which is the unmarked choice in this context, but the translator opts for the marked form. The motivation may again lie in that the translator wishes to produce a more vivid picture of this narration. Here the translator has moved his deictic centre to Mars, and imagines himself standing on Mars and observing how the rover works on Mars. The readers are invited to use their imagination and bring this scene to their present. The motivation of choosing the proximal demonstrative here is not because of actual physical distance but how the translator wants the readers to see the picture and engage with the text.

Shifts from distals to proximals fall into the second largest among all the deictic shifts, but again, it is necessary to clarify whether the translators' intention may be involved here or it is more likely to be an accommodation to the norm in Chinese, since the statistics suggested that proximals are higher than distals in non-translated Chinese. As we have indicated, a large proportion of deictics in this corpus function anaphorically and textually, and we have also pointed out at the beginning that on these occasions the proximals are preferred in Chinese. This is one reason accounting for the shifts from distal to proximal deictics, as in example 4.3.

Example 4.3

(ST) That is because the RoomLink works only with Sony's own Vaio line of PCs. (Gibbs, August 2003)

(TT) 這是因爲 RoomLink 只與新力公司的 Vaio 系列個人電腦相容。(Zhong, Sep 2003)

(BT) This is because RoomLink is only compatible with Sony company's Vaio line of PCs.

In this example, the demonstrative pronoun refers back to an extended passage, which is supposed to be what this clause is explaining. The referent is a preceding part of the text, and the demonstrative is a discourse deictic here. Therefore, the translator seems to shift towards a proximal demonstrative because of the constraint of Chinese anaphoric conventions. But it has also been argued that the preference for proximals in anaphoric use is not a binding rule and involves a complex number of subjective factors. Example 4.4 shows that the translator's decision is not usually so straightforward.

Example 4.4

(ST) The signal disappeared. That caused us some pause. I was trying to act calm. It was nerve-wracking (Musser, March 2004).

(TT) 訊號消失了，那使我們猶豫。我故作鎮定，但這實在是很折磨人。 (Fu, April 2004).

(BT) Signal disappeared, that caused us pause. I tried to act calm, but this really torments people.

It is intriguing in this example that there are two anaphoric pronouns: the first *that* is translated into a distal *na* without translation shifts, and the second pronoun *it* is translated into a proximal *zhe*. We find the syntax structures in these two cases and also the above examples are almost identical, but the translation opts for different deictic demonstratives. It again supports Lyons' (1968:677) account that factors other than linguistic constraints are involved in the choice of anaphoric demonstratives.

Psychological involvement needs to be brought into the discussion. In this example, *na* refers back to the fact that the signals have disappeared and the reaction is upon a group of people (*us*), including the narrator. On the other hand, *zhe* refers back to the mental state of the narrator himself, and therefore involves more personal emotions. This level of psychological involvement seems to be the main reason for most of the shifts from distal to proximal in this corpus.

The final category to be discussed within the shifts towards proximity is the omission of *na*. The omission of distal deictics is largely related to the relatively restricted function of distal deictic expressions in this corpus, almost solely associated with non-near physical distance in exophoric uses or with detached psychological distance in textual uses, as in example 4.4. On the other hand, the use of English distal demonstratives in this corpus does not relate to negative connotations only; they have other functions. For example, they are sometimes used to refer to a less specific expression. In English, *that* has always been regarded as less specific: "'that' has no specific reference point - it is simply interpreted as 'not this'" (Halliday and Hasan 1976:59). On these occasions, the translation tends to replace these less specific determiners by the more unmarked zero demonstrative in Chinese.

Example 4.5

(ST) To adapt the wormhole for time travel, one of its mouths could be towed to a neutron star and placed close to its surface. The gravity of the star would slow time near that wormhole mouth, so that a time difference between the ends of the wormhole would gradually accumulate (Davies, Sep 2002).

(TT) 要改造蟲孔以進行時光之旅，可以把它的一個開口拖往中子星，並安放在

其表面附近。中子星的重力會使蟲孔開口處的時間減慢，這樣就會使蟲孔兩端的時間差逐漸累加。(Chen, November 2002)

(BT) To reshape wormhole to conduct time travel, [one] can tow one of its mouths to neutron star, and place around its surface. Neutron star's gravity will make time near wormhole mouth slow, in this way making a time difference between two ends of wormhole.

In this example, the source text uses *that* to modify the noun *wormhole mouth* to suggest that the wormhole mouth is mentioned in the previous sentence. But in Chinese the translator omits this demonstrative. It is interesting to compare this example with example 4.1. In both a referent is repeatedly referred to: *the manuscript* in 4.1 and *the wormhole* in this example. In example 4.1 the translator constantly shifts towards proximity, but in this example the translator modifies all the repetitive noun phrases with a zero form. One obvious difference is that here the writer is talking about a research in hypotheticality, so *that wormhole mouth* does not point to a specific wormhole in reality. Also, in this example the focus is not on the wormhole mouth, as can be shown from the fact that they often occupy the object position. The focus in this example is the experiment procedure — as indicated by the proximal compound *in this way* in the translation, and it is to this resultative relationship that the translator would direct the readers' attention.

Therefore, we can observe that omissions of distal deictics remove emphasis from the referent when the translator does not require much attention from the readers, and, by contrast, make those marked by the proximal demonstrative — where the writer would require more attention from the reader — more salient.

4.2.1.2. Deictic Shifts towards Distance

In this section some counter-examples of the dominant trends of deictic shifts will be examined. The counter examples are important because they ascertain that alternative strategies are also available to the translator. Based on this confirmation, the discussion of motivation or purposes behind the choices is meaningful. We would like to explore under what conditions the translators make different deictic choices from the examples considered in the previous section.

Additions of distals are the largest category in the distancing trend, but only less than one third of the additions of proximals. Similar to the addition of proximals, many of the additions in this case are from the unmarked definite article *the*, indefinite article *a*, or pronoun *it*. Examples of how translators make choices between proximal, distal and zero deictics may be seen in example 4.1. Here the shifts from neutral to remoteness are examined.

In the following example, the writer is describing his experience of wearing the newest high-tech PDA on his forehead on the streets of Manhattan:

Example 4.6

(ST) As I walked down Madison Avenue, trying very hard to keep a straight face, many of the passers by did double takes and gaped at me. But many others didn't even notice the thing, and quite a few jaded individuals took one look and turned away, unimpressed (Alpert, August 2002).

(TT) 我走下麥迪遜大街，非常努力保持面無表情，的確有很多行人仔細看了我第二眼，然後張口結舌望著我。但有更多人根本沒注意到那東西；幾個滿臉倦容的人看了我一眼就把頭轉開，沒什麼感覺。(Wu, October 2002)

(BT) I walked down Madison Avenue, trying very hard to keep expressionless, many of the passers by did look at me twice and look stunned. But many more people didn't even notice that thing; several jaded people took one look and turn head away, no feeling.

To translate the definite article *the*, which does not have an equivalent in Chinese, the translator at least has choices from zero article, distal and proximal demonstratives, or pronouns. Here the translator chooses to use a distal demonstrative. The use of a distal demonstrative indicates a detachment from the writer and also from the readers, and emphasizes the strangeness of the situation. In this example, the referent is something that is hardly noticed in the narrative event, and the use of a distal can emphasize the detached attitude from the writers. In terms of the interactivity in the translation, we find that the use of a distal in such cases does not go against the trend of active intervention and engagement from the translator. Actually, the translation shifts from

neutral to distance can be regarded as a strong involvement of the translator in the construction of the text, from the emotionless *the* to a negative emotional *na*.

As briefly mentioned earlier, we find that one distinctive feature of the distal demonstrative in SA-TC is its relatively restricted function. It is almost often associated with a negative connotation — an undesirable event, a failed hypothesis in the past, etc. The distal deictics are often used in contrast to a focalised referent or a main story line, to which the translator tends to guide the readers' attention. To associate the distal demonstrative *na* only with negative and detached contexts is the trend identified only in this corpus, and seems largely related to the translators' strategy. In the reference corpus (see 5.2.1) many instances of *na* that do not particularly associate with any negative connotations are identified. Therefore, the restricted function of *na* should be regarded as characteristic of this corpus, and this restriction sharpens the contrast between more involved *zhe* and more detached *na*.

Another reason for the addition of distals is related to the exophoric function, especially physical space in terms of time distance. The extent of the addition of distal time adverbs or demonstratives that are related to temporal deixis is much higher than that of proximal ones. In the statistics we have also shown that the number of distal time adverbs (60 instances) is much higher than that of proximal adverbs (14 instances). The translators obviously feel that there is a need to specify a distant time reference.

Example 4.7

(ST) To know what really happened, physicists need to subsume relativity in a quantum theory of gravity. [...] but progress was almost zero until the mid-1980s (Veneziano, May 2004).

(TT) 爲要了解當時到底發生了什麼事，物理學家得把相對論納入量子重力理論才行。[...] 而直到 1980 年代中期，還幾乎是毫無進展。 (Lin, June 2004).

(BT) To understand what actually happen *le** at that time, physicists have to involve relativity in quantum theory of gravity. [...] but until the mid 1980s made almost no progress (* a particle indicating the compeletion of an action in the past).

In the translation, the temporal point in the past is indicated by the particle *le*. The addition of a distal temporal adverb here would add more emphasis to this particular time reference. We find that the translator tends to add time adverbs especially when referring to distant temporal points — far in the past or in the future, which according to Qian (1983) are referred to through the distal demonstrative *na* and its compound temporal deictics in Chinese (in contrast to near-past/future). As we have discussed in 2.5.1, the distinction between near or non-near past and future lies in the writer's psychological attachment to the referent. The shifts towards distant temporal deictics are related to emphasis on detachment from a past event, which may be a failed hypothesis, a failed attempted experiment, or a challenged theory, all of which are to be distinguished from the main story line. Thus, the translator expresses detachedness.

Shifts from proximal to distal compose the smallest trend in this corpus - only 10 instances. As we have discussed above, if the translator agrees with the source writer for the use of marked proximal deictics, the proximals will be carried across into Chinese; if the translator chooses, consciously or instinctively, to downplay the salience, the unmarked form zero demonstratives are usually adopted. Distal demonstratives, as we pointed out, stress physical or psychological distance only as a need to contrast with the other here-and-now referents.

Example 4.8

(ST) Neurophysiologists had used standard electrodes that resemble rigid needles to record single neurons. These classic electrodes worked well but only for a few hours, because cellular compounds collected around the electrodes' tips and eventually insulated them from the current.

(TT) 長久以來，神經生理學家就以類似堅硬鋼針的標準電極，來記錄單一個神經的活性。那種老式電極記錄的效果不錯，不過只能維持幾個小時，因爲細胞的組成物會聚集在電極的尖端，最後造成電極與電流絕緣。

(BT) Since long ago, neurophysiologists used standard electrodes similar to rigid needles to record activity of single neutrons. That kind of old electrodes records work not too bad, but can last for only a few hours, because cellular compounds will gather at the electrodes' tips, and eventually cause the electrodes to become insulated from the current.

Because the preferred anaphoric demonstrative in Chinese is *zhe*, it seems reasonable for the translator to relay the proximal demonstrative in the source text. But the translator's choices have the effect of highlighting the distance of temporal referent in this passage, reinforced by the addition of another temporal adverb at the beginning of this passage, which more explicitly stresses the temporal distance from the point of utterance. Here the focus is drawn to the old and unsatisfactory characteristics of the electrodes under discussion, which may later be distinguished from a current and more satisfactory alternative.

The last trend to be discussed is omission of proximal deictics. Most of the omitted proximals in the corpus are the plural distal demonstratives *these*, whereas the omissions of the other proximal deictics *this*, *now*, and *here* are rare. The singular *this* usually refers to a more specific item than the plural *these*, and that may explain a much higher omission of the plural proximal demonstrative. Some have been replaced by unmarked zero demonstratives, and others have been expressed by a different syntactic structure, which retains the definiteness of the referent but not the function of pointing. Example 4.9 will now be examined.

Example 4.9

(ST) …many of the most publicized scientific studies have subsequently been refuted, and other data have been distorted in debates over the propriety of deriving some of these cells from human embryos (Lanza and Rosethal, June 2004).

(TT) 在爭論人類胚胎的幹細胞取得的正當性之際，還有其他研究結果也遭扭曲失真。 (Tu, July 2004).

(BT) While arguing cells from human embryos *de* propriety of deriving, results from many other studies have also been distorted.

In example 4.9, the English underlined demonstrative *these* plays a textual-oriented function, pointing to a referent modified by a following prepositional phrase. In Chinese, the structure has been changed so the phrase indicating the definiteness of the noun has been fronted, thus the textual-oriented deictic function seems no longer necessary. The translator can still relay the proximal demonstrative, but doing so

would add more emphasis — more than definiteness — in the translation.

Another important reason for omission is related to repetition of the referent, especially in the case of proper nouns: "*Brown's* scepticism" instead of "*this* scepticism", or "theories of relativity" instead of "*these* theories." Here the consideration is less related to the consideration of proximity or remoteness, but is used rather to avoid an ambiguous reference that might make reading problematic. This phenomenon of repititions of the proper nouns, as well as the phenomenon to make explicit the topic chain by adding more referents, can be another trend identified in this corpus: a trend to tighten cohesion. This trend is a noticeable trend that interferes with the distal-to-proximal trend discussed here.

In the final part of this section we would like to discuss examples of "intentional" shifts; this discussion is largely related to what Richardson (1998) referred to as a problem presented for the translators resulting from the shifts of time and place of text reception.

Example 4.10

(ST) This past April she was elected to the National Academy of Sciences... (Nadis, December 2003).

(TT) 2003 年 4 月齊澤姆被選爲美國國家科學院院士，...(Tu, January 2004).

(BT) In April 2003 Chisholm was elected to the National Academy of Sciences,

This is a case that does not directly go against the proximatizing or distancing shifts. Rather it is largely related to the inevitable shift of time or place of participants in text interaction in the process of translation. As we can see from the reference, the ST and TT were published in different years. This kind of shift, however, is very crucial to our analysis because they are evidence of the conscious and intentional shifts made by the translator, under the influence of the translator's choice, or even more likely the editors' or publishers' decisions. In our corpus, we find that all intentional shifts have had their deictic centre moved from ST writer to the translators, who identify their temporal-spatial uttering point with the Chinese readers. The translation points via deixis in a way that translators assume to be easier for the target readers to access the

textual world. They move texts to the reader rather than force the reader to imagine the way that the source text readers may read the text. This strategy strongly reflects the tendency of the translators to interact with the intended readership.

4.2.1.3 Discussion

An in-depth analysis of the three types of shifts under proximatizing trends showed that the translator's shifts are largely related to the generic feature of science texts and audience design for the TT readers. Anaphoric discourse references play an important role in the text in maintaining coherence for the target readers, who are assumed to be less familiar with the "SA genre". In a more conversational and journalistic style narrative, more exophoric uses of proximal deictics are found, which serve to visualize the textual world for the readers and construct solidarity with the readers. Overall, shifts towards proximity indicate a strong tendency of intervention and engagement in the translations, suggesting an orientation towards the target readers.

On the other hand, we find that the shifts towards distance do not necessarily contradict the translators' tendency to interact with the text and the target readers. In the shifts towards distance, the motivation may be an expression of the translator's detached attitude towards the referent, either physically or psychologically. The effect is that the referent is seen as something in the past or against the writer's agreement, and is distinguished from the main topic under discussion in the text. Therefore, the shifts towards distance do not decrease the level of interactivity between the translator and the text and the target readers.

In the translation the translators are constantly making choices between proximals or zero forms, but not distal demonstratives. The reason seems to be that in this corpus we find that the default deictic demonstrative is *zhe*. When it is desirable to draw more attention from the readers, *zhe* is selected; otherwise the translators will simply opt for the zero demonstrative. The translator shifts towards distance only when it is regarded as necessary or important to emphasize the physical distance or express a detached or negative psychological state. This can be largely related to the interactive purposes of the popular science genre — the writer attempts to involve the participation of the reader, so the translator generally opts for the proximal or the

neutral option, but not the extreme of the other direction to avoid the unwanted effect of alienation.

Evidence of intentional temporal deictic shifts identified in the text provides further valuable evidence for our discussion. Shifting the deixis towards the time of translation reception is evidence that the translator here is adopting an "instrumental" approach — they intervene actively in the text to move the texts to the reader. This evidence is in line with our finding above from the analysis of the textual features.

4.2.2 Personal Reference

In 4.1.2 we present the quantitative observations in the parallel English-Chinese corpus, and there are two important findings: (1) SA-TC has a closer frequency of first and second personal references to SA-E than to SC-SCI, and this high frequency should be considered as a marked phenomenon in the SA-TC, which is not seen in the Chinese norm. (2) The translation shifts of 1PP are more particularly salient than those of 1PS and 2P. The trend suggests that the function of 1PP may be of importance in SA-TC. Here we would like to explore what these figures suggest if we bring the context and co-text into discussion.

4.2.2.1 Marked Trends: Shifts towards Explicit Personal Reference

We begin our discussion by considering the marked trends of shifting towards explicit first and second personal reference. The trend is regarded marked because, according to the quantitative findings, SC-SCI has a much lower frequency of these references than has SA-E. Therefore, the shifts in SA-TC towards explicitation of personal references should be regarded as a violation of the Chinese norm and thus a marked trend. This marked trend is realized mostly through the additions of personal references, but in some cases non-omissions of redundant personal references can also be regarded as marked choices.

Among the trends of addition in the three person categories investigated here, 1PP has the largest number of additions and it is also the most significant shift observed in the translation. In SA-TC we can see that the translation of 1PP displays complicated features and this can be linked to the striking flexibility and multifunctionality of 1PP.

As is well documented in the studies of personal reference: "Given the right functional and contextual factors, *we* can be used to encode any of the six persons [1PS/P, 2PS/P, 3PS/P] that are usually distinguished in English" (Muhlhausler and Harre 1990:177). In terms of personal relationship, there seems to be a conflict in the implication of *we,* as the boundary between inclusive and exclusive functions is not always clear[57]. Also, the text producers may use the reference with double implications (Wales 1996:62). This is why the translation of *we* is always complicated in translation, but on the other hand the translators also rely on the flexibility of first person plural reference to create different effects.

Let us first look at an example of addition of 1PP.

Example 4.11

(ST) Could yesterday's convenience be married to today's technology? (Howard, February 2004).

(TT) 我們不禁要想，昨日的便利有沒有可能與今日的技術結合起來呢？(Zhang, March 2004).

(BT) We cannot help thinking, can yesterday's convenience combine with today's technology?

The translation conveys the same information as the source text but adds an explicitly expressive action — "we cannot help thinking". The addition of 1PP here is an optional choice made by the translator since the added clause does not affect the meaning of ST, but it creates a more interpersonal effect then the source text. The presence of the writer and his action is implicitly suggested in the ST but not explicitly indicated. In TT, the translator assumes that the readers are thinking together with the writers, both sharing the same ground and preparing for the coming passage. The inclusive *we* is commonly used in the popular science genre because it mitigates the gap between the writer as an expert on one hand and the readers as less knowledgeable on the other hand. The inclusive *we* in the genre of popular science can make scientific knowledge more appealing to lay readers who are traditionally

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[57] The unclear boundary is true in both Chinese and in English. As noted in 2.5.3, Mandarin, as used in Southern China — including Taiwan, does not make distinction between inclusive and exclusive 1PP.

regarded as outsiders of the science community.

The increase of 1PP is also often correlated with the shifts from passive to active voice in the Chinese translation. Translating English passive voice into Chinese active voice with additional subjects seems to be inevitable, as almost every writer of English-Chinese translation textbooks (e.g. Liu 1987:138, Chau 1995:319, Wang 2003:55) reminds the translators to avoid using the passive voice as much as possible. The explicit marked passive structure is not commonly used in Chinese. Passive structures posing difficulty in the Chinese translation also include impersonal passive structures such as *there is*... and *it is*.... Translators are to a large extent encouraged to shift the passive voice into active voice. However, the actual strategies differ according to the translator's interpretation of the ST's motivation for a passive voice and whether the TT follows the same purpose. Chau (1995:319), for example, discusses several situations in which the English passive voice occurs – when the subject is unknown, not important, avoided purposefully, etc. — and he proposes seven corresponding strategies, such as using active voice with zero subject, supplying subject available from the context, supplying generic noun as the subject, or maintaining the passive voice for ideological or stylistic reasons. Therefore, turning active voice into passive voice with a personal subject is only one possible solution that the translator can choose from a pool of alternatives, and these shifts are regarded as preferred but not obligatory. We will examine how the shifts in translation create different effects from the source text. Example 4.12 illustrates a shift from the impersonal passive to an active voice.

Example 4.12

(ST) Before the videocassette recorder <u>there was the movie projector and screen</u>. Perhaps you remember your fifth-grade teacher pulling down a screen...(Howard, February 2004).

(TT) 在卡匣式錄影機出來之前，<u>我們用的是電影放映機與屏幕。</u>或許你還記得，小學五年級時老師把屏幕拉下來的情景...(Zhang, March 2004).

(BT) Before the videocassette recorder was produced, <u>we use movie projector and screen</u>. Perhaps you still remember the situation when your fifth-grade teacher pulled down a screen...

The clause underlined underwent a shift in transitivity in the TT. The existential process becomes a material process with an actor *we* performing the process *use* on the goal *the movie projector and screen.* This strategy is commonly called "restoration" (Liu 1987:224): the translator turns passive into active structure and supplies an adequate actor. The subject chosen here by the translator is an inclusive 1PP. Sometimes the distinction between inclusive and exclusive 1PP is not clear, but here we have two reasons to consider this choice an inclusive one. First, there is only one writer. Also, the following clause asks the readers about their experience with the movie projector, which clearly considers the reader one of the people (the *we*) who used these devices in the past. The inclusive *we* is used as the subject in many instances of shifts from passive to active voice in our corpus; the reason may be that the function of the inclusive *we* is in line with the overall rhetorical purpose of this genre to bring the text closer to the readers[58].

Besides the inclusive *we*, we also see a lot of instances when 1PP is supplied by the translator as a generic personal reference.

Example 4.13

(ST) Is it possible to build a machine that would transport a human being into the past or future? (Davis, Sep 2002).

(TT) 我們真能造部機器把人傳送到過去或未來嗎？(Chen, November 2002).

(BT) Can we really build a machine transporting a human being into the past or future?

In this example, the source text questions a fact about the possibility of a time machine. The TT shifts from the impersonal passive to active voice: 1PP is the actor, *build* is the process, and the time machine is the goal. In this case the Chinese 1PP is considered as a generic reference because the person who is likely to carry out the action is neither the writer nor the reader but scientists in this field. Although it does not seem to make sense in its denotation sense, on a pragmatic level the 1PP refers to

[58] This hypothesis can be further supported by the findings that SA-NTC and SA-TC both share the same rhetorical purposes and display a similar frequency of 1PP (SA-TC: 0.33% and SA-NTC: 0.30%), whereas SC-SCI has a much lower frequency of 1PP (0.08%).

everyone in this world, all sharing the dream of building a time machine. By transforming to a material process with a subject including the writers and the readers as well as many other people in the world, the question becomes more relevant to the readers and invites the readers to think: are the other people in this world and *I* going to build a time machine? Will *we*? Whereas the writer of the source text presents a question, the translator asks the readers a question.

1PP is also often added in the translation because of its generic function. Many instances of 1PP in the translations are used to replace the other indefinite personal references in English, such as *one*, *people*, *individuals*.

Example 4.14

(ST) The prefrontal cortex is the seat of the so-called executive functions of the brain, including the internal censor that keeps individuals from blurting out what they really think in awkward social situations…(Ezzell, February 2003).

(TT) …那是腦中所謂「行政主管」的位置，包含了內在的監視器，讓我們在尷尬的社交場合不至於吐露真言… (Pan, March 2003).

(BT) …that is so-called the position of "administration executive", including the internal censor, prevents us from blurting out the truth in awkward social situations…

The English indefinite personal lexicons - *individuals* as well as the other terms such as *people* and *one* - all have their dictionary equivalents in Chinese but many of them are translated as 1PP in SA-TC. These terms and 1PP can all play an indefinite function, but they are different in implying the degree of text participant's involvement. Indefinite pronouns such as *one* and the other indefinite references diminish the intimacy in the interaction. On the other hand, 1PP constructs a sense of belonging and solidarity, and this creates a different interactive effect in the translation.

In the discussion of the impersonal use of personal reference in 2.5.3, we identified several alternatives which are exchangeable in terms of their generic functions: mainly the three plural references *you*, *they*, *we*. In the corpus, we found two examples of shifts from English 2P to Chinese 1PP.

Example 4.15

(ST) As deeply mysterious as acceleration is, if you just accept it without trying to fathom its cause, it solves all kinds of problems (Musser, Riess, and Turner, February 2004).

(TT) 對於如此神秘深邃的加速現象，假如我們就接受了這個發現而不再探究其根源，那麼其他各種宇宙學問題便能迎刃而解。 (Li and Zheng, March 2004).

(BT) To such a deeply mysterious phenomenon of acceleration, if we just accept this finding but don't further investigate its cause, then all kinds of universal problems can be solved.

The use of reference to the addressee in the ST is interesting because the reader is clearly not the one who is going to investigate the universal problems. As this is an article written by the researcher in this field, the unmarked choice should be a self-reference to the writers, as they are the researchers who are going to deal with the issue. However, this kind of mismatch in personal reference is not uncommon in our daily life. Text producers often manipulate the marked choices of personal reference to affect their audience's perception. The use of *you* in the source text can be regarded as a generic personal reference because it refers generally to anyone who accepts this phenomenon. The impersonal use of the second personal reference is thought to contribute to "a sense of informal camaraderie" because "the speaker assigns a major 'actor' role to the addressee" (Kitagawa and Lehrer 1990:752). By involving the readers in the action within the text, the text producers invite the readers to go into their world and share the same point of view.

The translator differs from the ST writer's position relative to the readers and opts for 1PP. There is ambiguity here. The distinction between an inclusive or exclusive reference is not always clear. The exclusive *we* is a plausible interpretation in this case because there are three writers and the reference may refer to these three researchers. However, it is more likely to be an inclusive *we*, which is a more common use of 1PP observed in this genre. According to Myers (1989:28), a key factor maintaining the relationship between the expert writer and the layman readers in English popular science writing is to "avoid insulting the readers, to try to make them feel like part of

the community." The inclusive first person plural reference is a useful linguistic tool which helps the writers to achieve the goal of taking the readers as their in-group members. Now we see a similar trend in the Chinese translations: 1PP has also been used as a sign to express solidarity in Chinese popular science writings (not only in SA-TC but also in SA-NTC, see 5.2.2).

Both choices of interpersonal reference in ST and TT show their consideration of the readers, by either addressing the readers or including the readers. Nuances can be made between the two choices: The use of impersonal 2P in particular can sound presumptive if the speaker is familiar with this context but the readers are not, and thus "the addressee is forced to play a role which is not apparent to him" (Kitagawa and Lehrer 1990:753). Lay readers without sufficient understanding about the description in this example are forced to accept the writer's point of view imposed on them. This may be why the translator opts for 1PP. Mey (2000:47) comments that *we* "has the positive traits that we associate with 'people like us'", whereas *you* and *they* implicitly carry the connotation of "people such as you", or "people like them". By adopting the inclusive personal reference the translator avoids the risk of imposing upon the readers the connotation of being out-group members.

Now let us look at the addition of 1PS and 2P, which are much less significant in number compared with the addition of 1PP. It is found that explicitation of reference to the writers or audiences is often related to the situations when the personal dimension is considered not sufficiently clear in the source text. Let us take an example from the text *A Great Echelon of Birds*, a journalist's experience in bird watching. The story is narrated from the journalist's point of view. Although we have discussed from the beginning that implicit personal references are preferred in the Chinese norm, the translator in this case, however, chooses to add three instances of 2P, and this is a very significant optional choice made by the translator.

Example 4.16

(ST) …these amazing birds can be seen from many vantage points between late February and early April: from blinds, from cars or vans, from a warm viewing center, on foot, from bridges. And there are many sites from which to watch: centers,

sanctuaries and fields between Kearney and Grand Island, the stretch of river where the birds are most concentrated (Holloway, January 2004).

(TT) ...每年的 2 月底到 4 月初，你都可以觀賞這些令人驚奇的鳥兒。你可以佔據各種有利的位置，如掩蔽帳、汽車或是旅行車、暖和的觀鳥中心、橋上，或者是步行；你也可以在其他地方觀察，像是自然中心、保護區，以及卡爾尼到大島之間的田野，這個河段聚集了最多的鳥群。 (Wang, February 2004).

(BT)...every year from late February to early April, you can watch these amazing birds. You can occupy all kinds of vantage points, such as blinds, cars or vans, a warm viewing centre, bridge, or on foot; you can also watch from other places, such as nature centre, sanctuaries, and fields between Kearney and Grand Island, this stretch river gathers most birds.

The addition of these three 2P in Chinese creates different effects in reading. The English writer describes ways of seeing the bids, with birds and sites as the subjects leading the sentence. For the reader who is thinking about going bird watching while reading along the text, this passage is like an implicit suggestion to them. For the other readers with no interest in participating, this narration can be read as a narration of the fact that birds can be watched from various places. But in the translation explicit reference to the reader is added and directly involves the reader in the process of reading. The rhetorical purpose changes from narration to a bold-on-record (Brown and Levinson 1987) suggestion.

The translator's choice to make 2P explicit has a marked motivation. On one hand, it seems like a stylistic choice because the three *ni* form three clauses in a parallel structure and make the text read smoothly. Or, we can also argue here that the shift from passive voice to active voice is a preferred structure in Chinese. Nevertheless, we have already argued that the active structure is only preferred and not obligatory; moreover, the choice of 2P as the subject is certainly an optional choice. To account fully for the shifts taking place in this example, we cannot neglect the pragmatic explanation. As we mention in 2.5.2, what guides the Chinese writers to make the choice between an explicit personal reference or a zero personal reference is the effect of "highlighting" (Li and Thompson 1981:663). This notion of "highlighting" can be further elaborated from an interactive point of view: where the writers choose to

highlight a particular reference, they either present a reference which has particular meaning or to which they want the readers to pay extra attention - i.e. make a marked decision. Thus, the translator makes a marked decision according to the pragmatic purpose. This example illustrates how the guideline of "markedness" is involved in the translator's decision against linguistic preference.

Another occasion when the translator tends to shift a passive structure into an active personal structure and add 1P or 2P as the actor of the process is when the ST writer puts the focus on the object, the event, or the process, rather than on the person, as shown in example 4.17.

Example 4.17

(ST) In a vacuum, where air resistance is not a factor, an object sent on a flight has a final downward speed that is, amazingly enough, equal to its initial upward speed (Mirsky, February 2004).

(TT) 你可能不相信，在沒有空氣阻力存在的真空狀態中，拋射的物體，最後掉落地面時的速度就等於一開始向上拋出時的速度。 (Gan, March 2004).

(BT) You may not believe, in a vacuum without air resistance, the speed of an object sent on a flight is equal to the initial upward speed.

In the Chinese translation, the addition of the second personal reference *ni* has the effect of increasing interaction by directly pointing towards the addressee. The readers are directly involved in the texts with the assumption made from the writer that they "may not believe" the fact stated here. On the other hand, English uses *amazingly enough*, which generally refers to the reaction of anyone (including the writer himself) to this statement. Regarding the shift to sentence-initial position, by beginning the sentence with an explicit warning to the readers that something contradicting their belief is going to follow, the Chinese texts catch the attention of the readers and enhance their concentration. In this example, the addition of the second personal reference together with the shift to sentence-initial position reinforces the effect of reader-involvement.

The motivations of the translation shifts in 4.16 and 4.17 may be first a syntactic consideration, such as the less preferred passive structure and inserted adverbial phrases in Chinese, but the solutions are, however, guided by the overall interactive purpose of this genre[59].

The marked trends to make personal reference explicit can also be reflected in the translator's choice not to omit some interpersonal references when on those occasions omissions are the preferred choice. In 2.5.2 we suggested that the largest difference between English and Chinese personal reference is their frequency, and a major reason for this is that Chinese prefers zero personal reference as unmarked choices in maintaining personal reference (Huang 1994:208). If the translator uses too many explicit person referents in the maintenance of personal reference, the maxim of quantity[60] will be violated in the communication with Chinese readers and convey an extra unnecessary implicature. In such cases, the retained referents will generate added pragmatic effects and the translator is often assumed to make such decisions for special reasons. The example below demonstrates the case of non-shifts with particular pragmatic effects. This example is from a journalist's narration about his experience in trying the new technology of "screen writing".

Example 4.18

(ST) After only a few days of using the Toshiba and Fujitsu machines, I'd cluttered up their hard drives with a bewildering array of files. Finding my interview notes (either the handwritten Windows Journal files or the converted Microsoft Word documents) took about as long as rummaging through the mounds of folders scattered across my desk (Alpert, April 2003).

(TT) 用了幾天東芝和富士通電腦後，我就製造了大量的檔案，胡亂地塞在硬碟各處。要找到我的採訪筆記（無論是手寫的 Windows 筆記本檔案或已轉換好的微軟 Word 文件）所用的時間，也和翻查散落在我書桌上的成堆資料夾差不

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[59] Again, the analysis of the Chinese comparable corpus in Chapter 5 will show that SA-NTC also shares the characteristics of using 2P more frequently than the Chinese reference corpus does, so this seems to be a unique feature common to the two SA corpora with the same interactive purpose.

[60] Maxim of quantity is one of the five principles of conversation cooperation proposed by Grice (1975). The idea is that in a conversation a cooperative interlocutor tends to provide an appropriate amount of information, not too little but not too much either. If the speaker gives too much or too little information, the addressees may assume that the speaker did so with particular meaning and thus generate extra interpretation by themselves.

多。(Wu, May 2003).

(BT) Having used Toshiba and Fujitsu computers for several days, I produced a large amount of files, cluttered up everywhere in hard drives. The time spent on finding my interview notes (either the hand-written notes files or the converted Microsoft Word documents) is similar to the time used to rummage the mounds of folders scattered on my desk.

We can argue that the use of the possessive pronoun *my* twice here is redundant since without any other specification it is assumed that the writer looked for *his* notes on *his* desk. But the non-omission may be related to the implied meanings of the possessive pronouns in this example. As the writer is commenting on his bad behaviour in organizing the documents, it is important to stress that the writer talks about the messy interview notes and the disorganized desk that are characteristic of *his* style. It is because of the writer's personal condition that the new technology does not seem to be very useful to him. We will see a counter-example (example 4.19) to this one in the discussion below.

Overall, in this section we considered how the translators make marked shifts towards explicit personal reference by adding explicit referents and maintaining redundant referents. These choices violate the norm of Chinese science writing, but we suggest that these choices are motivated by the interactive purpose of the genre of popular science, and we will find evidence in Chapter 5 that SA-NTC, sharing the same interactive purpose, also bears the features of these trends of shifting towards explicit personal reference.

4.2.2.2 Unmarked trends: Shifts towards implicit personal reference

Now we shall examine the trends of shifts towards implicit personal reference. This trend is regarded as unmarked because implicit personal reference is the Chinese norm. Therefore, most of the translation shifts merely conform to the preferred norms in the target culture.

The translators often omit personal referents when those referents are understandable from the context or the co-text, as in example 4.19.

Example 4.19

(ST) But one morning on the downtown local, I looked up from my screen and saw that the person sitting next to me was playing the same game on his Treo (Alpert, October 2004).

(TT) 但某天早上搭地下鐵時，我從螢幕上抬起頭來，看到坐在旁邊的人也在他的 Treo 上玩同樣的遊戲。(Wu, November 2004).

(BT) But one morning when taking subway, I looked up from screen, saw the person sitting next playing the same game on his Treo.

In this example, three references to the text producer (one subject, one possessive pronoun, and one object) are found in one sentence, and only one is retained in the translation. If the three 1PS are all retained in the translation, Chinese readers may perceive redundancy since without the reason to highlight the fact that this is *my* screen but not that of the others, the readers would generally take for granted that the writer was looking up from the screen that he was holding. Different degrees of tolerance for informativity may be brought into the consideration here by the translator. As we suggested in the discussion of example 4.18, if the translator uses too many explicit person referents in the maintenance of personal reference, the maxim of quantity may be violated in the communication with Chinese readers and convey an extra unnecessary implicature. This example can be regarded as a counter example to example 4.18. The translator in this example makes a preferred choice under the consideration of cooperation constraints in Chinese without any pragmatic motivation involved.

Besides zero reference, the reflexive – *ziji* – is another alternative commonly used to replace explicit personal reference in the Chinese translations. The Chinese reflexive *ziji* is different from English reflexives *-self* in that *ziji* is not a suffix. *Ziji* can stand by itself, and it can be used to refer to all personal references, depending on its precedent.

In general, omission can be mostly explained by substitution for zero reference and reflexive. A question may arise here: do these omissions suggest a less interactive dimension in the TT? On the surface it seems so, because the number of interpersonal

reference decreases. However, when considering the pragmatic effect, we may argue that Chinese readers derive as much from the translations as the English readers from the source text. Li and Thompson (1981:658) comment that an utterance with a zero personal reference may look as if something is missing to English readers, but to Chinese readers it is perfectly grammatical in the appropriate contexts. In other words, the translations with the omitted personal references exemplified above communicate an adequate effect to the Chinese readers. If the translators choose to maintain an equal number of personal references to the English counterparts, the additional personal reference may result in added pragmatic effects in Chinese.

However, it is undeniable that the omission of a large number of 1PS and 2P makes the writer and the readers less prominent in the translation than in ST. We may further explore the phenomenon of omission along the line of the translator's consideration of politeness. 1PS and 2P can contribute to the interaction by creating "the sensation of a face-to-face discourse between persons" (Fowler 1986:95), so the distance between writer and readers is narrowed. But frequent use or inappropriate use of 1PS and 2P may run the risk of being what Brown and Levinson (1987) call a face threatening act (FTA)[61]. Studies have found that in academic writing the writer prefers to minimize FTAs by avoiding the use of 1PS while making criticism (e.g. Myers 1989). The use of 2P can also threaten the negative face of the readers by being felt to be too authorative (Quirk *et al.* 1985:618). In popular science the tension between scientist and his community does not exist, so more personal interpersonal references may be used. However, it is also suggested that in an expert-layman communication, the writers should be cautious about not insulting the readers by treating them as out-group members (Myers 1989:28). That is, in popular science the tension between writers and readers still exists. In Chinese translations, we find that maintaining the face of the readers sometimes overrides the ST's purpose to construct an intimate writer-reader interaction. In other words, the Chinese translators are more cautious of the negative implication of overuse of 1PS (e.g. being egocentric) and 2P (e.g. being intrusive). The concerns of politeness in the translation are shown in example 4.20.

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[61] The politeness theory proposed by Brown and Levinson (1987) is discussed in 2.2.5.

Example 4.20

(ST) Be aware that the ticket-purchasing process can be as overwhelming as the center itself, as there are separate tickets for most of the activities; if you can, figure out what you want to see before you arrive (Holloway, March 2003).

(TT)要注意的是，這兒的購票方式跟這個園區一樣有點複雜，因爲大多數展覽都有各自的門票。如果可以，在前往之前請先規劃要看的展示。 (Gan, April 2003).

(BT) Notice that, the ticket purchasing process here is as complicated as this centre because most of the exhibitions have individual tickets. If possible, please plan what exhibitions to see before go.

This example is taken from a text in which the writer introduces a museum of art and science and at the end of the article offers some tips to the readers who would like to visit the museum. In the ST, three *you* are used as if the writer is talking face-to-face to the reader. But in the translation the three references to the addressees are all omitted. One explanation for the omission is that the translator adopts the preferred shifts towards implicitation. However, as argued in the previous paragraph, the omission of 2P here may be related to the translator's politeness strategy to minimize an FTA. The evidence of the translator's concerns about politeness is further supported by the addition of the expression *qing* (please) in Chinese. We may suggest that even though this seems an unmarked shift, with the addition of words like *please*, the translator may also be cautious about the act of making suggestions and does not want to sound too authoritative.

In this section, we have examined the reasons for omission identified in the corpus and from the point of view of writer-reader interaction. We argue that omission of interpersonal references in the translations does not imply a weaker interactive relationship between the translators and the TT readers. A decrease in the number of 1PS and 2P has pragmatic implications from the point of view of politeness, suggesting that the writer is more cautious about presenting himself/herself in the text and directly referring to the addressee to avoid FTAs.

4.2.2.3 Shifts of Perspective in Translation

So far we have discussed personal shifts from ST to TT, which may be conscious or unconscious decisions made by the translators. For example, the omission of repetitive personal references may be a decision made instinctively by the translators. However, there are some occasions when the translator's decision is more deliberate than others. This is related to the shifts of personal participants in the translation.

Example 4.21

(ST) One obvious place for improvement in our math and science skills can be found among the hosts of and callers to the country's many sports talk radio programs (Mirsky, February 2004).

(TT) 從美國許多運動類的談話性廣播節目主持人和打電話進來的聽眾身上，就可以很容易地看出美國人的數學與科學技能的確有待改進。 (Gan, March 2004).

(BT) From the hosts of and callers to many sport talk radio programs in the USA, [one] can easily see that American's math and science skills need to be improved.

Our in the source text is an inclusive first person plural reference, including the ST writer, an American, and ST readers, who are assumed to be American readers. In the target texts, however, the personal deixis shifts from the first person perspective to a third person perspective, excluding the TT writers and TT readers from participation in the text. An alternative strategy for the translator is to relay the personal reference as such and leave the readers to figure out whether they are included in this reference or not. But here the translator takes an active role in mitigating the position of themselves and readers as out-group members of this statement. In other words, the translator's voice is heard. This is a clear example that shows that the translation's perspective shifts when the translator communicates with the target audiences.

4.2.2.4 Personal Reference in Direct Speech

We have talked about interpersonal references as explicit revelations of the text producer and receiver, so the frequency of these references can be taken as a measurement of active interaction between the writer (or translator) and the reader. Even when they are used in a generic sense, they still have the traits of interpersonal features. However, in our corpus there are occasions when the use of 1PS, 1PP, 2P

does not refer to the text producers and receivers: when they are used in direct speech. Direct speech and indirect speech are two common strategies to report others' speech, and studies have found in the genre of popular science a wide-ranging use of interview, quotes, and reporting verbs such as *say* (Hyland 2005:97). In these instances, the first and second personal references refer to the characters in the conversation. To be specific, the reference in the direct speech should not be counted as an indicator of the activeness of writer-reader interaction, because it does not refer to these text participants. However, it is argued here that they can be regarded as a strategy adopted by the text producer to create a vivid interaction with the readers. When the writer wants to report the speech of others, he can choose between direct and indirect speech for different pragmatic effects. In literary stylistics it is argued that reported speech mediated via indirect speech makes the readers feel detached from the characters, while the use of direct speech makes the expression more vivid and authentic (Toolan 1988:121).

In example 4.22 the writer reports a conversation he heard on the radio, an argument about one character's slip of tongue. By quoting the conversation with two speaker's references *I* and *you*, this writer visualizes the argument as if the two characters were arguing in front of the readers.

Example 4.22[62]

"The Klu Klux Klan."

"It's not Klu. It's Ku. It's not Klu Klux Klan, it's Ku Klux Klan."

"I didn't say Klu Klux Klan, I said Klu Klux Klan."

"You said it again, you said Klu."

"I did not say Klu Klux Klan, I said Klu Klux Klan."

"You said it again. You said Klu."

(Mirsky, February 2004).

[62] The example is given here to illustrate the use of direct speech in the corpus. In this case no shifts in person references are made in the translations; all the uses of 1PS and 2P are relayed as such. Therefore in this case we present the English text only and not the translation and back translations.

The first person and second personal reference here refers to the two characters in the argument, not the text writers and readers, so they do not directly contribute to the writer-reader interaction in the texts. On the other hand, they contribute to the interaction with the readers by trying to bring the text closer to the readers. What we are trying to argue here is that although the personal reference in the direct speech seems not appropriate to be counted as indicators of interaction in the quantitative analysis, in the qualitative analysis these instances show how they are related to the writer-reader interaction in a way because there is an alternative option of presenting it as reported speech.

4.2.2.5 Discussion

In this section we have discussed the shifts of first and second personal references taking place in SA-TC and explored their possible motivations and effects. We have found that the marked choices of making additions in the translation are found mostly in 1PP. Compared with SC-SCI which uses a much lower frequency of 1PP, the frequent use of 1PP in SA-TC can be regarded as a marked feature to achieve the rhetorical purpose of the genre of popular science. The use of inclusive 1PP is particularly frequent in this genre, as documented in the study of English popular science writings, because it helps to establish solidarity between writers as the scientists and readers as outsiders of the science community. The additions of 1PS and 2P are relatively few, but there is also some evidence that non-shifts of personal references can also be a marked choice when they are considered redundant in the Chinese norm. Here the choices of shifting towards explicit personal references made by the translators can create the effect of a more interactive-oriented attitude in SA-TC than in the traditional Chinese science writings.

On the other hand, trends of omission are regarded as preferred shifts because they conform to the Chinese preference for implicit reference to writers and readers in the interaction. However, some examples suggest that reasons other than preference may also be involved, such as politeness strategy. In some circumstances the decision to omit direct address to the readers may be a strategy to avoid being intruding on the readers, especially when other politeness strategies (such as the addition of *please*) co-exist in the co-text.

In conclusion, in this section the most important finding is the salient use of 1PP in the translations, a strategy that is often used to construct solidarity with the readers. Evidence from shifts of perspective further confirms that the translators do not merely report interaction between ST writers and readers, but they involve target readers as participants in the interaction in the translations.

4.2.3 Junction

This section sets out to explore the two findings reported in the quantitative analysis of junction in 4.1.3: (1) the addition of junction is a marked trend because Chinese tends to use less junction than English, whereas omission of junction may be regarded as an accommodation to the Chinese norm. (2) Among the six categories of junction, the representative adversative, causal and hypothetical junctives deserve more attention because in these categories addition outnumbers omission; by contrast, the representative additive, alternative and temporal junctives have more omission than addition. It would be interesting to investigate why the translators deal with these two groups of junctives with different strategies and how the differences may be related to the strategy of interaction.

4.2.3.1 Marked Trends: Shifts towards Explicit Junction

The analysis begins with the marked trend: addition of junction. We have pointed out that this trend represents a violation of the Chinese preference for implicit junctive relations, so all the examples discussed in this section can be regarded as optional shifts[63] made by the translator. That is, these shifts are the results of neither Chinese grammar constraints nor preferences in Chinese texts, but a choice made by the translators. Having clarified the junctive addition in the Chinese translations as an optional shift, we can then pursue explanations for the translator's choices.

In the discussion in 2.5.3, we pointed out that Beaugrande and Dressler (1981:74) regard junction as an optional device used according to the communicative point of view, rather than an obligatory linguistic feature regulated by grammatical rules. This then posits the question: if a text can still be a text without junction, then why do text

[63] See 3.3.3 for the definitions of three categories of translation shifts.

producers use junction? Mauranen (1993:168) suggests two answers to this question: to increase the readability of texts and to make a difference to the illocutionary force of the text. The two answers are actually in line with our discussion of two dimensions of interaction within text: reader-oriented and writer-oriented (see literature review 2.2.1). In the following discussion we will explore the examples within texts along these two interactive dimensions of junction.

The first explanation is to enhance the readability of the text. Junction functions as signals that point the readers where to go and what to expect next, so junction saves the reader's time when making a connection between propositions. Some cognitive linguistic researchers (e.g. Carrell 1987; Mauranen 1993) have tried to prove this point by conducting empirical experiments. For example, Carrell's (1987:54) experiments of recall studies show that readers given texts with more junctives have a more accurate understanding of the text. Given that complex factors are involved in the reading process, the results of these experiments cannot be taken as absolute proof, but they may at least point out correlations between the presence of junction and readability. Following this discussion, we may argue that the translator adds more junctives in their writings as a courtesy to the target readers by facilitating the reading process.

Let us look at example 4.23. The previous passage before this sentence described the role and status of Pythia, and in example 4.23 the writer presents a fact that may seem contradictory to the readers' assumption.

Example 4.23

(ST) Extraordinarily for misogynist Greece, the Pythia was a woman (Hale *et al.*, August 2003).

(TT) 希臘人雖以厭惡女人出名，但皮媞亞卻是女性。 (Yao, September 2003).

(BT) Greek though notorious for their hatred against women, but Pythia *que** is a female (*an adversative junctive adverb).

In the source text the adversative relation is achieved through lexical cohesion: *misogynist* versus *woman*, and is also implied by the sentence-initial adverb:

Extraordinarily. This passage demonstrates how cohesion can still be inferred by the readers even without explicit junctives. But the translator chooses to add explicit markers in the translation. If we follow a linear process of reading, English readers would work out the adversative relation only when they reach the last word in the sentence, woman — which instantly triggers the lexical cohesion with the word misogynist in the previous clause. By contrast, the translation employs adversative junctives that function to "ease problematic transitions" and "alert receivers" to expect something different (Beaugrande and Dressler 1981:72-73). Therefore, the target readers are prepared for a contradictory statement when they read the signal *though* in the second word of the sentence, and the expectation is further confirmed by the junctive connecting the second clause. Finally, the junctive adverb *que* indicates to the reader that the highlight point is now coming. Therefore, in terms of the linear reading progression, the addition of junction in the translation can help the target readers to process the text more efficiently.

An easy reading process is crucial in the genre of popular science. As has been emphasized in the literature review (see 2.1.1) and in the analysis of other interactive features, the readers of popular science writings rely on explicit cohesive relations to make sense out of the lexical relations, given their lack of background knowledge (Myers 1991:5). Expert readers can process the text through their understanding of lexical meaning (as the lexical cohesion in example 4.23), or they can even supply their background knowledge to understand the text. But the lay readers to a large extent rely on explicit cohesive markers — junction being one of the most useful devices, to find their way in the process of reading. The translation in 4.24 can be regarded as an example of how the translator anticipates the readers' difficulty in processing this scientific phenomenon, and supplies an explicit junctive.

Example 4.24

(ST) Engineers had warned that Spirit might go silent for 10 minutes or so until it rolled to a stop. A tumbling lander does not make a good transmission platform (Musser, March 2004).

(TT) 工程師早就預告精神號可能會消聲 10 分鐘左右，直到它停止滾動，因爲滾動的登陸艇無法好好發射訊號。 (Fu, April 2004).

(BT) Engineers already give notice in advance that Spirits might lose sound for 10 minutes or so, until it stops rolling, because a rolling lander cannot transmit signals well.

Three shifts occur in this translation. First, the translator merges the two clauses together and adds a causal junctive at the beginning of the second clause. This relates to Baker's (1992:192) suggestion that languages differ in "how much to say in one go, and with how the relations between such chunks of information are perceived and signalled." In this case the translator groups the two clauses together and provides a signal that the second clause is going to be an explanation to the first clause. Moreover, the translator shifts the noun phrase construction into a verbal process in the second clause, and makes the explanation even easier to process. By saying that the lander cannot make a good transmission platform, the readers have to elaborate further the meaning that it is not a good transmission platform so it cannot transmit signals properly. It is the action of the lander not the state of the lander that directly causes the silence. This further elaboration of the noun phrase structure into a verbal process and the addition of causal junctive may all be related to the translator's concerns for the readers' ability to relate the second clause as an explanation to the first one.

In some cases, the writer does not supply an additional junctive only but also additional information, which even more clearly demonstrates the translator's involvement in the text production and consideration of the target readers' insufficient scientific knowledge.

Example 4.25

(ST) If time dilation did not occur, those particles would never make it here (Davies, September 2002).

(TT) 如果時間扭曲沒發生，這些粒子早就會因衰變而永無到達之日。 (Chen, November 2002).

(BT) If time dilation did not occur, these particles would already because of decay and never reach.

In the ST the writer presents a hypothetical relation: a condition and a possible result. But in the translation a further explanation is inserted. The explanation is not given in the ST, and the ST readers have to look for the co-text or context to supply the information. The translator, however, shows courtesy to the readers and adds an explanation in this hypothetical relation. The explanation shows that the translator thinks about the readers' expectations and needs, and takes action to respond to the imagined obstacles presented in the process of reading. This is what Hoey (e.g. 1983; see literature review 2.2.3) proposes as a dialogue and interaction between writer and reader. The translator imagines that the readers may question why particles would not reach the destination and therefore supplies an additional explanation.

So far we have explained the potential reasons for junctive addition as a courtesy to the readers. But, as in our discussion of interaction (2.2.1), interaction takes place in two directions. The writers may want to express concerns for the readers but they also want to make the readers accept their viewpoints, i.e. expression of illocutionary force. In fact, junction has also been widely regarded as a linguistic device to achieve rhetorical effect. From a communicative point of view, junctives can be exploited by the text producers to control the interpretation of the readers (Beaugrande and Dressler 1981:74). From a literary linguistic perspective, novelists can use implicit junctives as a strategy to involve participation from the readers (Fowler 1986:67). The evidence from empirical experiments also suggests that a text with a higher frequency of junctives reads more authoritative, logical, and convincing (Mauranen 1993:167). Example 4.26 contains no difficult scientific knowledge and shows no particularly important transitions, but the translator adds three junctives to highlight adversative and causal relations. The translator may not add these junctives as a conscious decision, but the effect of the translation certainly makes it different from the ST.

Example 4.26

(ST) [1] The next day engineers discover that cork bands on the rocket have come unglued. [2] Departure is set back another week — a week I don't happen to have free. [3] Lesson two for the space chaser: buy refundable plane tickets and keep your itinerary flexible. [4] There is always another rocket, after all. [5] I resolve to catch the late August launch of a new orbiting observatory, the Space Infrared Telescope

Facility (SIRTF) (Gibbs, November 2003).

(TT) 第二天，工程師發現火箭上的隔熱軟木層脫落，出發日期又延後一個星期，但那時我剛好沒有空。所以，太空追夢者的第二課是：買可以退費的機票，並保持旅程彈性。畢竟總是有另一次火箭升空嘛！因此，我決心去看 8 月下旬升空的新軌道觀測站--太空紅外線望遠鏡（SIRTF）。 (Guo, December 2003).

(BT) The second day, engineers find cork bands on the rocket unglued, departure date is set back another week, but then I don't happen to be free. So, lesson two for the space dream chaser is: buy refundable plane ticket, and keep itinerary flexible. After all there is always another rocket lift off! Therefore, I decide to go to see the late August launch of a new orbiting observatory — the Space Infrared Telescope Facility (SIRTF).

In this example it can be argued that the translator actually adds his own interpretation of junctive relations in his translation and imposes it on the readers. Unlike the previous examples in which the translator highlights the implicit relations achieved through lexical meaning in the source text, the source text in this example does not have a clear adversative and causal relation. For example, sentences [5] and [6] are not necessarily in a causal relation but continuity in time—e.g. *Then, I resolve to catch the late August launch.* An addition of *therefore* between sentence [5] and [6] in the translation forces the target readers to link the author's decisions to go to another launch back to the previous statement that there is always another launch. But the source text readers may just interpret sentence [6] as the author's next step without particularly establishing a causal relation with the previous sentence. The adversative relation within [1] and the causal relation between [2] and [3] may be slightly clearer than between [5] and [6], but it is not necessarily the case that every ST reader makes the same interpretations as the translator does. Some of the ST readers may well just read the sentences as a sequence without really noticing an adversative transition within the sentence. What we are trying to argue here is not whether the translator makes the correct interpretation of the source writer's intentions or not, but to demonstrate that by inserting more junctions the TT readers are left with less freedom to interpret the texts than the ST readers. As Thompson (2001:61) explains, the reader-oriented and writer-oriented interactive dimensions are "essentially two sides of the same coin." On one hand we can say that in this example the translator saves the

reader much time by linking relations between sentences, but on the other hand the translator forces the readers to accept his own interpretation of the texts, which may not be the only way to interpret the texts.

The examples discussed so far show that the translators add junctives to help readers understand the texts easily, and this may result in the effect of limiting the readers' creativity in interpreting junctive relations. This may explain why the quantitative analysis shows that the trend of addition is more salient in the category of adversative, causal and hypothetical groups but not in additive, alternative and temporal junctives. Additive and temporal junctives usually signal a continuous relation — logical sequence or temporal sequence, and continuity is considered as an unmarked condition (Beaugrande and Dressler 1981:72) [64]. That is, without any other specification (e.g. causal, adversative, and hypothetical junctives), the readers will take for granted that the information in the incoming clause is a continuity of the previous event. Therefore, the translator does not have to help or control the readers to process a junctive relation that would not be understood in any other way. On the other hand, Segal *et al.* (1991:50) found that *so*, *because* and *but* have meanings more than continuity *and* in the narrative texts. These junctives often involve the character's subjective perspective. That is, the interpretation of these relations is less straightforward than temporal and additive relations and involves a process of reasoning and judgements. Therefore, these are junctive relations for which the readers require more assistance in efficient reading and which may involve more of the translator's subjective interpretations.

Though less quantitatively significant, there are still a few additions in junction that signal continuity, such as additive junction. The following is an example:

Example 4.27

(ST) With fewer coyotes, their prey — voles, mice and other rodents — have

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[64] Although Beaugrande and Dressler make comments based on English junction, this seems also to be the case in Chinese. In the Chinese grammar textbook, we see suggestions that junction can be omitted when "two clauses are set in apposition, where the meaning of the second clause is in some way consequential on that of the first" (Yip and Rimmington 2004:328). In other words, in Chinese it is also true that consequential relations usually do not need to be specified by explicit markers.

exploded in number. That has benefited red foxes and raptors (Robbins, June 2004).
(TT) 隨著草原狼的減少，牠們的獵物如田鼠、家鼠和其他齧齒動物等，數量則大爲成長。而這又爲紅狐和猛禽帶來好處。 (Yao, July 2004).
(BT) With the decrease in the number of coyotes, their prey such as voles, mice and other rodents, have increased largely in number. And this *you** brings benefits to red foxes and raptors (*additive junctive adverb).

The relation between the two sentences in 4.27 is a succession. The decrease in the number of coyotes brings benefits to their preys, and this first benefit then generates the second benefit described in the second sentence. In the source text the link is provided by the demonstrative *that* which refers back to the entire first sentence. In the translation the link is marked more explicitly by the additive junctive *er* and adverb *you*. Although it is difficult to argue whether the addition of additive junctives in this case actually enhances readability in any obvious way, since the relation is not that difficult to infer from the source text, the difference is that in terms of the effect the additive relation in the translation is more explicit and thus more stressed. In the next section, we will further explore the instances of omission to see whether they are merely an accommodation to the target language norm or if there may be some optional shifts involved.

4.2.3.2 Unmarked Trends: Shifts towards Implicit Junction

As discussed in the literature review (2.5.3) and pointed out in the quantitative analysis (4.1.3), Chinese uses junctives less frequently than English does. Therefore, omission should be regarded as a preferred option that accommodates to the Chinese norms, and therefore less important to the investigation of translators' interactive strategies. On the other hand, additive, alternative and temporal junctives are especially relevant here because they are the categories with higher omission than addition. That is, when considering these three junctive categories the translator tends to follow the norm rather than adopting any strategy out of choice. For example,

Example 4.28

(ST) But the trees are unchanging, stranded on mesas or hillsides or washes, broken and beautiful, made of stone (Holloway, May 2002).

(TT) 但是樹不變，困在台地、山坡、河床上，殘破而美麗，都是石頭。(Wang, July 2002).

(BT) But the trees are unchanging, stranded on mesas, hillsides, washes, broken and beautiful, all stone.

In this example the source text writer uses alternative junctives to connect three nouns, but the translator simply presents the three items without any junctives. Beaugrande and Dressler (1981:72) comment that disjunction (their term for alternative junctives) is the only obligatory junctive in texts, whereas other junctive relations can all be implicitly inferred by the readers. However, in this example, the translator takes out the alternative junctives and doing so seems not to affect the reading. The reason is that in terms of the semantic meaning of *or* - to choose either A or B, it is true that the readers would need an explicit junctive, otherwise they cannot process the meaning. But the pragmatic use of junctives is not very straightforward. Sometimes the use of *or* is similar to the use of *and* as in this case, when the writer is only listing a few examples and the existence of one item does not exclude another. Therefore the translator may just consider the alternative relations as being not important in this example and decide to leave the junctive relation implicit.

A close investigation of the concordances finds that the trend of omission happens both when the junctives are used structurally as in 4.28 - according to Halliday and Hasan (1976:227), meaning within the sentence, and cohesively, meaning cross-sentence. Example 4.29 below demonstrates omission of an additive junctive that connects sentences.

Example 4.29

(ST) The pilots of flight 232 proved that it was possible to control a modern airliner using only the engines. And this discovery led some innovative engineers to wonder if they could program flight computers to achieve the same feat, making it easier for a crew to safely land a heavily damaged aircraft (Corder, August 2004).

(TT) 這架 232 號班機的飛行員證明了，僅僅依靠引擎，也可能控制現代飛機。這個發現激勵某些創新的工程師開始思考，是否可在飛機的電腦內加入新程式，以達成相同的功能，讓飛行員更容易把嚴重受損的飛機安全降落在地面

上。(Zhong, September 2004).

(BT) This flight 332's pilots proved that, simply relying on engine is also possible to control a modern aircraft. This discovery inspired some innovative engineers to start wondering, whether it is possible to add new programs in the aircrafts' computer, to achieve the same function, make it easier for pilots to land a heavily damaged aircraft on the ground safely.

It is interesting to compare example 4.29 with example 4.27 because they are just like counter-examples to each other. In example 4.27 the translator chooses to add a sentence-initial additive junctive on top of the reference provided by the demonstrative in English; whereas in example 4.29 the translator removes the sentence initial *And* in the source text and keeps only the discourse deictic reference *zhe* (*this*). The junctive relations in the two examples are very similar: the proposition in the first sentence contributes to the results in the second sentence. There is no obvious reason to explain why this translator chooses omission in this instance but makes an addition in example 4.27. We can only conclude from the quantitative analysis that cases like example 4.29 happen much more often than example 4.27, and this means that the translator tends to make preferred shifts when it comes to additive junctives.

4.2.3.3 Translation of Multifunctional *And* and *Er*

In this section we will focus on the translation of *and* and its Chinese counterpart *er*. Both of them have multifunctional uses and it is sometimes difficult to decide whether the translation should be considered as a shift or not.

Let us look at the English *and* first. It is well noted (e.g. Carston 1993:27) that *and* has a heavy function load and that readers have to infer the relation by themselves when they feel that *and* says more than continuity of information. Therefore, the translation of *and* especially involves the translators' subjective interpretations and decisions.

We first look at an obvious shift from an additive relation to an adversative relation.

Example 4.30

(ST) The stately specimens that grow in the valley bottom are 70 to 100 years old, and not a newcomer is in sight to take their place (Robbins, Jun 2004).

(TT) 在河谷底部，壯麗的樹叢已有 70~100 歲，但放眼望去卻沒有新生的樹接替。 (Yao, July 2004).

(BT) In the valley bottom, spectacular trees are already 70~100 years old, but there are no newborn trees in sight to take [their] place.

And can also signal adversative relation. It is difficult to argue whether the *and* in example 4.30 actually bears any adversative meaning or if it is just empty and carries two propositions in contrast to each other. According to Carston (1993:28), the readers will find the most relevant interpretation for the meaning of *and* when they are not satisfied with the surface additive meaning, so in the source text the relevance is left for the readers to supply. In the translation, however, the meaning is marked more explicitly. This can be considered as an optional choice made by the translator, because the translator has choices, either to keep the ambiguity as such or to clarify the ambiguity based on her interpretation. The translator chooses to make clarification in this case, and this again has the effect of making the reading process more efficient, and at the same time controls the readers' creativity in making interpretations.

Shifts from an additive to a causal junctive are also frequent, as in example 4.31.

Example 4.31

(ST) Unfortunately, to date, gene expression profiles of ES cells have yielded conflicting results, and the search for a clear ES cell signature continues (Lanza and Rosenthal, June 2004).

(TT) 不幸的是，至今對胚胎幹細胞基因表現特性的研究結果相互矛盾，所以找尋胚胎幹細胞特徵的努力仍在繼續。 (Tu, July 2004).

(BT) How unfortunate it is, that to date results of studies on gene expression profiles of ES cell conflict with each other, so the research for ES cell profiles continues to work hard.

In this example the translator's involvement is more obvious because the source text does not really specify a causal-consequential relation. This example resembles our discussion of example 4.26, which shows how the translator may add junctives based on personal interpretation and thus reduce the possibility of interpretation of the readers. There is a successive relation in this example because the proposition in the first sentence leads to the result in the second sentence. There is not necessarily a clear causal-consequential relation. We have found so far that the addition of causal junctives seems to involve more of the translator's personal judgement than the other categories.

The Chinese additive junctives also have similar ambiguous multifunctions to indicate more than additive junctive relations. It is difficult to categorize the semantic relations carried by *er*. The meaning of *er* is more complicated than *and*. Some Chinese linguists take *er* as an adversative junctive (e.g. Lü 1999:192), but there are also others who count *er* as an additive junctive in their corpus study (e.g. Chen 2006). In our quantitative analysis, the solution is to categorize all the occurrences of *er* as additives because it is difficult to make a clear-cut differentiation between the different functions or ambiguity of this junctive. Here, however, we can provide more detailed discussions of the different functions of *er*. *Er* happens when the source text uses either additive or adversative junctives, such as in examples 4.32 and 4.33.

Example 4.32

(ST) They expected, for instance, that the wolves would cull many of the elk that lived in the park. When the wolves — once the region's top predator — were gone, the elk population had burgeoned. And the new generation of Canis behaved as predicted (Robbins, June 2004).

(TT) 例如，他們希望灰狼可以多加捕殺國家公園內的麋鹿。灰狼曾經是這個區域的高階捕食者，牠們消失後，麋鹿族群量大增。而新一代的灰狼果然不負所望…, (Yao, July 2004).

(BT) For instance, they expected wolves can cull more elk in the national park. Wolves were once this region's top predator, after they disappeared, the elk population largely increased. *Er* the new generation of wolves indeed do not fail the expectations.

In this example *er* functions as an additive junctive, as *and* in the source text. In this sense *er* can be regarded as an additive junctive that provides cross-sentential link between the two propositions. But in the following example, *er* has a different function.

Example 4.33

(ST) A few in the scientific community had started to wonder whether the nuclear-transfer technique would work with primate physiology to produce therapeutic stem cells. But Woo Suk Hwang of Seoul National University and his colleagues proved that it could be done (Lanza and Rosenthal, June 2004).

(TT) 科學界有少數人曾懷疑，細胞核轉植技術能否適用於靈長類，以製造醫療性的幹細胞。而韓國漢城大學的黃禹錫和他同事，則證明這項技術在靈長類也是可以辦到的。 (Tu, July 2004).

(BT) A few people in the scientific community have doubted whether the nuclear-transfer technique of stem cells can apply to primate physiology to produce therapeutic stem cells. *Er* Woo Suk Hwang of Seoul National University and his colleagues *ze** prove this technology can be done in primate physiology (*an adversative adverbial junctive).

The two sentences in example 4.33 are in an adversative relation. In the ST *But* is used to indicate this junctive relation, whereas the target text has *er*. The Chinese readers have to follow the development of the second sentence to decide whether *er* here is an additive or adversative symbol — but the adverbial junctive *ze* in the second clause of the sentence determines the interpretation for the reader.

In some cases the function of *er* is more ambiguous, as in 4.34, and the target readers are left to make their own interpretations.

Example 4.34

(ST) Doing both basic and applied research — an option open only to market leaders like Microsoft — may supply the preconditions for the vaunted serendipity that leads to breakthroughs (Stix, June 2004).

(TT) 想得到足以誇口的意外發現，進而讓研究出現突破，先決條件可能是兼具基礎研究與應用研究，而只有像微軟這樣的市場龍頭，才有能力做此選擇。(Zhong, July 2004).

(BT) To get a vaunted accidental discovery and make further breakthroughs in research, the preconditions may be to have both basic and applied research, *er* only the market leaders like Microsoft have the ability to do so.

The inserted clause in the source text is moved to the end of the sentence in the translation and a junctive *er* is provided to maintain a relation between the two clauses. However, the meaning of *er* here is not as clear as in 4.32 and 4.33. In the source text, there is only one sentence, and the inserted clause functions as an add-on explanation to the previous proposition, so no clear adversative or additive junctive relations are involved. In the target text, however, because the order of the information presented is changed, the shifted clause can still function as a further explanation as in the source text, but it also looks like a contrast between the ideal model of research and the fact that only Microsoft has the ability to do so. In this case an increase in the explicitness of cohesion does not seem to lead to an explicitness of coherence. Blum-Kulka (1986/2000:312) makes an insightful comment with respect to shifts of cohesion in translation:

> Contrary to natural discourse, translation is a process by which what is *said* might become obvious and clear, while what is *meant* might become vague and obscure.

This is exactly what we see in example 4.34.

4.2.3.4 Discussion

In this section we have examined the pattern of junctive shifts in the translation and related it to the interaction between the translator and the target readers. The addition of junctives is regarded as an optional shift because Chinese prefers to use junctives less frequently than English does, and we find that the reason is largely related not only to the translator's consideration for the readers but also reflects their involvement in the texts. On one hand, the translator adds more junctives, especially adversative,

causal and hypothetical ones, to help the readers process the link between propositions. Given the fact that the readers may not have sufficient background knowledge to process implicit junctive relations contained within context or lexical cohesion, explicit junctives signal a clearer direction for the readers to make coherence in the text. We also find occasions when the source text writers signal a junctive relationship in an ambiguous way and actually more than one interpretation is possible, but the translators make it explicit in their interpretations and thus leave little room for the target readers to interpret. This presents a more authoritative presence of the translator in the texts than is created by the ST writers.

Omission of junction, considered as a preferred shift to conform to the Chinese norm, also takes place in the translation but mainly on additive, alternative, and temporal junctives. To explain from an interactive point of view, these are junctive relations that the writer considers to be less necessary to assist the readers' processing or to constrain the readers' interpretations because they contain less ambiguity for the readers.

Shifts from one junctive to another also happen in the text, and these are obvious cases where the translator's options are involved. The shifts happen mostly from the additive junctive (a multifunctional junctive) to the other more explicit relations. The shifts also take place from alternative to additive, when the translators consider there is no need to stress the alternative junctive relation, and opt for additive junctives, which simply indicate continuity.

In conclusion, the shifts of interactive patterns observed in this section indicate the writer's interaction with the readers. The phenomenon of explicitation may be regarded as common to all translation products, but the interactive dimension of the process of translation should not be ignored.

4.2.4 Hedges

This section presents a contextual analysis of hedges. Even though no significant trends of translation shifts were identified through the corpus statistically, we will examine the minor trends of shifts in the corpus and their possible effects in the

translation. In fact, a detailed survey of the concordances shows that shifts of hedges only take place in two situations: a hedge is omitted when more than one hedge co-exists in the co-text, and when hedges are used to modify numerical figures. Therefore, excluding example 4.35, which is related to the first situation, we will focus on how translators deal with hedges modifying numbers — are they accuracy-oriented or are there writer- and reader-oriented motivations behind them?

First, we find a tendency to omit a hedge if it is accompanied by other hedging devices in the source text, such as questions, future tense, *if*-clause, or lexical hedges. Given that the reference corpus shows that Chinese uses hedges less frequently than the English does, we may regard the omission of hedges as a preferred shift[65].

Example 4.35

(ST) If true, her predictions could forever change the way we think about the structure of space. Several tests of quantum gravity could take place within the next few years (Gefter, December 2002).

(TT) 果真如此，她的預測將永遠改變我們對空間結構的看法。未來數年有好幾項量子重力實驗開始進行。(Gan, February 2003).

(BT) If true, her predictions *jiang* forever change our views of structure of space. Within the next few years experiments of quantum gravity Ø will start taking place.

In the source text, the modal verb *could* is used twice to indicate a possibility but not certainty. In the target text, one instance is translated as *jiang* (may be translated as *will*) indicating a stronger degree of possibility or even certainty in the future, and the other is omitted. But one hesitates to say that by omitting one modal verb or replacing *could* by *will*, the translation shows a higher degree of certainty than the source text because the co-text expresses a strong attitude of hesitation. *If* and *predictions* both indicate that this proposition is presented without full certainty and the temporal phrase *within the next few years* also indicates a future tense. It may be that given that Chinese generally uses fewer hedges than English does, the translator consciously or

[65] However, we do not have full confidence in claiming the low frequency use of hedges as a Chinese norm, given that only selected hedges are investigated in the corpus and there is no other support from any comparative linguistic studies with respect to the use of hedges between Chinese and English. Omission of hedges as preferred shifts should be regarded as a tentative claim here.

unconsciously makes omissions when there is more than one hedge modifying a proposition. Several other instances of omissions observed in the corpus resemble the context of example 4.35. But overall, these shifts at the micro-level do not seem to form a consistent pattern at a larger scale and it is difficult to argue whether there is a far-reaching effect on the attitude of the translators.

A more interesting finding concerning shifts of hedges is when hedges are used to modify figures. First, regarding the instances of omission, they often happen when hedges are used to modify figures with less scientific significance. Examples are figures that are not directly related to scientific results or findings but are about more general descriptions such as the number of staff in a lab, as in example 4.36.

Example 4.36

(ST) The initial research on MEMS resulted in his heading a team of about 100 people that built the LambdaRouter (Stix, March 2003).

(TT)根據微機電系統的初步研究成果，畢夏普率領一個百人小組，建立出「全光波長路由器」(LambdaRouter)。(Zhong, April 2003).

(BT) Based on results from initial research of MEMS, Bishop led a one-hundred-people team, to build LambdaRouter.

The word *about* may be a simple hedge modifying a number in this case, but this example presents an interesting case in which the use of *about* by the source text writer and the omission of it by the translator both have to do with the text producers' concerns for the exactitude that they think the readers need to know. The writer in the source text chooses not to report the exact number (for example, 103 people) but uses the hedge *about* to modify the approximate number *100* to indicate a fuzzy concept here. This is because the writer may consider it unnecessary to be precise here. As Crystal (1988:46) comments, in daily language "it would be intolerable if every time we spoke we had to recall our behaviour with mathematical precision." Therefore, the writer considers this information requires no mathematical precision and uses the hedge to convey an approximate number.

On the other hand, it can also be argued that the omission of the hedge in the translation is also a concern for the low precision required by the readers. In the review of hedges (see 2.5.4), we find that accuracy-oriented hedges provide a tool for scientists to remind readers that there is a gap between the ideal and the reality. Based on this framework, the removal of *about* in the translation can be interpreted as a sign that the translator considers it unnecessary to specify the uncertainty of the figure. The removal of *about* here may seem a distortion of the source text because the number is not precisely 100. However, the translator can be said to make the decision not from a truth-condition point of view but from an interactive point of view. That is, the readers are considered not to need to spend any effort on processing the approximation of the number: the straightforward information *one hundred* is what the translator expects them to know. In other words, by removing a hedge to an arguably false number, the translator actually moves towards something even vaguer: the source text chooses not to report an exact number but a rough number with a hedge, and in the translation presents only the number *100* without any modifier. This kind of shift happens several times in the corpus when the information has less scientific significance. These shifts reflect not the translator's confidence in the proposition but rather his consideration for target readers.

About in example 4.36 can be regarded as a reader-oriented hedge, and this suggests that the translator has some flexibility or needs to make shifts when considering his target audiences. Here we would present a contrastive example to demonstrate further the translator's strategy with relation to different functions of hedges. In example 4.37 below we will see that *about* is also used to modify figures, but it is not omitted in the translation and this can be related to the different function of *about* from that in example 4.36.

Example 4.37

(ST) Physicists ascribe the inflationary spurt to the potential energy stored in a new quantum field, the inflation, about 10-35 seconds after the big bang (Veneziano, May 2004).

(TT) 物理學家將暴脹所迸出的能量，歸因於大霹靂後約 10-35 秒，一個新的量

子場「暴脹子」(inflation[66]) 所儲存的位能。(Lin, June 2004).
(BT) Physicists *jiang** the energy of inflationary spurt, ascribe to about 10-35 seconds after the big bang, the potential energy stored in a new quantum field "inflation" (*a co-verb).

The writer uses a hedge here, not because the exact number is of little importance and the readers do not need to be told an exact number, but to specify that an exact number is impossible. This hedge reminds the reader that there is a gap between the figure presented here and what may happen in reality. In this case the translator relays the hedge as such without making shifts. A comparison of example 4.36 and 4.37 suggests when the figures are of important scientific significance and are accuracy-oriented, the translators tend to follow the source writer's use of hedges and make no shifts.

Now let us look at the addition of hedges to modify figures and their more obvious evidence of audience design. This often happens when the translator changes the American unit of measurement into one that is more familiar to the target readers, for example, from *five feet* to ***about 170 cm***. The hedge is added here because this is a rough equivalence, so it is modified by a hedge in the translation. The following example shows more clearly the translator's involvement in the translation shift.

Example 4.38

(ST) The 93,533-acre park is the only one in the park service system that offers visitors such a complete view of life in the late Triassic…
(TT) 這個公園面積 37851 公頃（大約相當於台灣面積的 1%），在美國國家公園中，是唯一訪客能看到三疊紀晚期完整生命景觀的地方。
(BT) This park has a size of 37851 hectares (around the equivalence to 1% of the size of Taiwan), in all American National Parks; [it] is the only place where visitors can see a complete view of life in the late Triassic.

In this example, a hedge is added for an explanation added by the translator as a reader-oriented strategy. Obviously, "around the equivalence to 1%…" is added in TT,

[66] The English terminology in the bracket is provided in the translated text.

and this can be regarded as an accuracy-oriented strategy because the size of the park does not exactly equal 1% of the size of Taiwan. The hedge here reminds the reader to allow room for flexibility. However, the use of the hedge can also be writer-oriented, i.e. related to the translator's face (Hyland 1998). In this example, the translator (or the editor) supplies an explanation that does not exist in the source text, so he bears the sole responsibility for this claim. Therefore, the translator is more cautious of using a hedge to mitigate any potential challenges from the target readers, especially from the science community as a referee group. A comparison of this example with example 4.36 can illustrate Myers' (1989:5) claim that the weight of FTAs does not rest on the content of a claim but on the writer-reader relationship. It is difficult to argue whether the readers need more accuracy in the number in this example or in example 4.36, but in this example the translator is in a more direct interaction with the reader. Given that a direct reference to Taiwan is made, the readers can suspect that the source of information comes from the Chinese translator, not from the English writer. Therefore, hedging may be considered by the translator to be more important in this example.

To conclude, even though the shifts of hedges in the translation are not as significant as those of other interactive features, we still find evidence that translators may manage a different interactive strategy from the source text writers. Omitting a hedge when there is more than one hedge in a proposition may be regarded as a preferred shift because the statistics (see 4.1.4) show that the Chinese language uses hedges less frequently than English does. But omission of hedges can also be a strategy to make things vague to save readers the trouble of calculating the flexibility of the information if the information is considered by the translator to be unimportant. Writer-reader interaction also shows its important role in the addition of hedges. We find translators using hedges to modify information added by themselves in the translation. When their voice is recognized obviously by the readers in the text, their claims are mitigated by hedges as a negative politeness strategy to avoid challenge. The pattern of shifts of hedges here provides an indication of how the translators' strategy is directed by their relationship with the target readers.

4.3 Textual Analysis: Interactive Strategies

The analyses in 4.2 present a variety of interactive strategies found in the corpus, but do not suggest that every text in the corpus uses all the strategies in the same manner; rather, individual texts in the corpus use interactive strategies differently according to the specific interactive purpose they want to achieve — usually realized in different text-types and sub-genres.

Of the following two articles, the first one is a scientist's challenge to the validity of statistical evidence, and the second is a first-hand report written by a scientist. The purpose of this discussion is to show that under the overall tendency of displaying stronger interactive strategies in the translated corpus, the translators may adjust the strategies to help target readers process different text-types and sub-genres.

4.3.1 Case Study 1: Terror Bull (反恐吹牛王)

Terror Bull is an article from a famous column in the SA magazine, called "anti-gravity". The column, written by Steve Mirsky, challenges concepts that are too often taken for granted and are rarely examined by the public. The source text includes 770 words and the translation has 773 words. Under the restriction of copyright, it is not possible to reproduce the full text here but both the source and the target text can be accessed on the website[67].

This article questions the credibility of statistics that are usually cited as scientific evidence. A story is used as an introduction to the arguments, and then several scenarios are given to give further support to how statistics can be manipulated in order to achieve a particular purpose.

Interaction in the source text is characterized by its frequent use of reference to the writer (*I*) and to the readers (*you*, except for those appearing in free indirect speech), and also the rather informal tenor, which makes the written texts read as if in spoken mode. The use of colloquial expressions such as *well, you know, now, I'm sure*, also

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[67] Source text: <http://www.sciam.com/article.cfm?chanID=sa006&colID=15&articleID=0007D856-99F3-111B-966083414B7F0000> Target text: http://sa.ylib.com/circus/circusshow.asp?FDocNo=556&CL=25 (Last accessed on 31st October 2007).

adds to the conversational style of the articles. The unconventional organization of the articles – such as the presentation of several scenarios/results/conclusions and the free indirect speech – suggests that the article is designed to be informal and different from conventional science writings.

In the following we will look at the translation shifts taking place in deixis, personal reference, junction, hedges, as well as other related interactive features, and investigate how the ST writer's interactive strategy is relayed in the target text. In each example, more than one shift is likely to take place, so the discussion may include discussion of several interactive features at one time.

In deictic shifts, the shifts towards proximity outnumber distance, which is the trend identified in the corpus. However, there are also several shifts towards distance, as shown in example 4.39.

Example 4.39

(ST) Actually, there were two days of rioting over gas shortages in Basra in August 2003, and officials did say it was a sign of an improving economy (Mirsky, September 2004).

(TT) 事實上 2003 年 8 月巴斯拉真的因石油短缺而發生兩天暴動，當時官方的確聲稱那是經濟改善的跡象。(Zhong, October 2004).

(BT) In fact in August 2003 Basra have two days of rioting due to gas shortages, at that time officials indeed say that is a sign of an improving economy.

In this example, the translation adds one distal temporal adverb and one distal demonstrative. One reason for the temporal adverb being added may be related to the fact that Chinese grammar does not encode the tense system in grammatical inflections. If it is necessary to make tense explicit (rather than understood from the context or co-text), a temporal adverb is usually used. The use of the distal demonstrative as an anaphoric reference may also be related to temporal distance, but a proximal demonstrative can also be used here, since proximal demonstratives are the preferred choice of anaphoric reference in Chinese (see discussion in 2.5.2 and 4.2.2). The use of a distal demonstrative here can also be motivated by the expression of

detachedness - to present a view with which the writer does not agree. In fact, the distinction between the established-but-incorrect and the alternative views is an important feature in this text. Example 4.40 will illustrate this point further.

Example 4.40

(ST) The decrease in injuries, as well as in deaths and in terrorist incidents, prompted Deputy Secretary of State Richard Armitage to say, "You'll find in these pages clear evidence that we are prevailing in the fight" (Mirsky, September 2004).

(TT) 而且，不僅受傷人數減低，連死亡人數與恐怖攻擊事件也變少了。對此，美國副國務卿阿米塔吉（Richard Armitage）表示：「本報告清楚證明，我們所向披靡。」(Zhong, October 2004).

(BT) Besides, not only the number of injuries decreases, deaths and terrorist incidents also decrease. Responding to this (*ci*, formal register), Deputy Secretary of State Richard Armitage said, "This (*ben*, formal register) report clearly proves that we are prevailing."

In this extract, the first proximal is used as a discourse deictic referring back to the situation described in the previous sentence. It is often the case that, because of syntactic differences, the Chinese translator needs to segment sentences and add anaphoric deictics to maintain coherence. In this case, the choice of proximal deictics is a preferred choice in Chinese grammar. However, there is another interesting use of deictics that can be found in this translation: the translator uses formal and standard deictics alternatively in the translation. In 2.5.1, it was mentioned that *zhe* (proximal) and *na* (distal) are the standard form of demonstratives in modern Chinese, but there are other obsolete forms that may be used in particular collocations or more formal registers, such as official reports. In this translation, the translator uses formal forms of demonstratives (此 *ci*,本 *ben*,該 *gai*) when the words come from the authorities who manipulate the statistics, such as the two instances of proximals in this example. In the first instance, the choice of *ci* rather than *zhe* in *responding to this* may not be entirely for reasons of formality, because *Duici* (meaning *responding to this*) is a fixed expression in Chinese. However, in the second case, the use of *ben* in *This report* in the quotation highlights the formality of the saying of the Deputy Secretary of State. Other examples, such as the formal demonstrative *gai*, an anaphoric reference often

used in written texts, are also used in the text to indicate formality. By switching between the formal and standard deictic systems, the translator presents the readers two points of view in this text. When referring to the authorities who claim the credibility of statistics, formal deictics are used, which makes the reader feel distant. On the other hand, when the writer's views are given, standard deixis is used, which makes the writer talk to the readers as if he were their friends, in contrast to the authorities.

Another shift that can be found in example 4.40 is the omission of second person reference in the Deputy Secretary of State's speech. The use of personal reference is a feature that characterizes writer-reader interaction in the source texts, and few shifts are found in the translation. The discussion in 4.2.2 points out that the Chinese reference corpus tends to use fewer personal references, so the omission of personal references in the translation may be regarded as a preferred shift. Nevertheless, the omission of *you* in this case may also be related to the translator's tendency to highlight formality in the authorities' speech and to distance the readers in such instances. From the consistent pattern of interaction with the readers managed by the translator in this text, we suggest that the omission of references is more likely to be motivated by interaction with the readers, rather than conformation to the target norm. In fact, addition of second personal reference is also found in the translation.

Example 4.41

(ST) Then, in June, the State Department updated the original document's incorrect statistics and revealed that terror-related injuries in 2003 in fact totalled 3,646. This number, according to mathematicians, is higher than 2,013 (Mirsky, September 2004).

(TT) 但 6 月時，國務院更正原始報告的錯誤數據，顯示 2003 年因恐怖相關事件受傷的人數，其實共有 3646 人。數學家會告訴你，這個數字大於 2013。(Zhong, October 2004).

(BT) But in June, the State Department updated the original document's incorrect statistics, showing that terror-related injuries in 2003, in fact totalled 3,646 people. Mathematicians will tell you this number is higher than 2013.

In this example, instead of presenting the source of evidence *according to mathematicians*, the translator makes the mathematicians tell the readers *you*. The target readers are directly addressed and more involved in this argument. Although there is only one instance of addition and one instance of omission of second personal reference, there is a coincidence with the use of formal and standard deictics in that the readers are more distant when the views in the texts are presented as being challenged, and they are more involved when the alternative views from the writer are given.

Also adding to the contrast between the two views in the texts is the explicitation of adversative junctives in the translation, as shown at the beginning of example 4.41. In the source text, the cohesion is provided by a temporal junctive *then*, indicating the sequence of the situation described in the previous paragraph. However, the translation chooses an adversative junctive, and thus signals to the readers to expect the other side of the story. Nevertheless, overall, the trend of junctive explicitation is not obvious in this translation. There are only two instances of addition of adversative junctives and one instance of causal junctives. The two instances of adversative junctives are both used as a cross-sentence link that signals the contrast between the taken-for-granted and the challenged views, which is the theme of this article.

The interaction in this article is highlighted by the salient involvement of the text producer in the writing. Unlike specialized science writing in which the writers are usually hidden behind the science community, this source text is characterized by the strong personal-opinion voices from the writers against the traditional science or social community. In the following we will see how the translator makes shifts to add to the prominent presence of the writer in the article, through addition of 1PS and attitudinal markers.

A marked shift in the personal category is a shift from inclusive 1PP to 1PS.

Example 4.42

(ST) Just don't tell us that chocolate ice cream is vanilla, especially when it's not even chocolate ice cream but only something a frat boy rolled in (Mirsky, September 2004).

(TT) 我只希望不要有人把巧克力冰淇淋硬說成是香草口味的，甚至那可能根本不是巧克力冰淇淋，而只是某位兄弟會少年曾在上面打滾過的東西。(Zhong, October 2004).

(BT) I just hope people don't say that chocolate ice cream is vanilla, when that's not even chocolate ice cream, but only something a frat boy rolled in.

The inclusive *us* in the ST, including the ST writer and readers, is translated as *wo* (1PS), functioning as a subject. In the translated corpus, as discussed in 4.2.2, the prevailing trend is addition of 1PP and the increase of involvement of the readers with the writers. Nevertheless, in this particular example, the translator excludes the readers and stresses the voice of the writer himself. In fact, this is the only instance of the use of 1PP in this source text - with the exception of those instances of 1PP in free indirect speech - and the translator omits this one, so there is no 1PP at all in the translation. The effect is a reinforcement of the narrator's personal-opinion voice in the target text.

The text producer's personal attitude is stressed further in the translation by the use of a few attitudinal markers to express excitement, such as the sentence-final particles *la* 啦, colloquial expressions used by young people *bang dai le* 棒呆了(meaning *stupidly superb*), and four uses of exclamation marks. These features are all characteristic of colloquial Chinese speech. The addition of these attitudinal markers in the translation makes the text producer appear more expressive and lively, and the use of colloquial language also reduces the distance from the readers – so they do not feel that they are being addressed by a scientific authority.

To conclude, in the source text, interaction between writers and readers is characterized by intimate conversation style – the frequent use of personal reference *I* and *you* and other informal expressions, and the purpose of this article is to present an argumentation that challenges the interpretation of statistics by the authorities. In the translation, we found that different strategies are used to highlight further the presentation of argumentation and manipulate the relationship between writers and readers. The translators use distant strategies (such as a formal tenor) when presenting views to be argued against, and use friendly devices (such as second person reference

and attitudinal markers) when presenting the alternative views given by the source text writer. In this way, the translator helps to relay more clearly the themes that the ST writer tries to argue in this text.

Section 4.2 discussed a variety of possibilities of the uses of interactive features and potential reasons behind the translation shifts, but this specific case presented in Study 1 (*Terror Bull*) suggests that the translator does not make all the shifts found in 4.2, but only particular shifts and these connect with each other. These shifts collectively have the effect of making the interactive purpose of this article more salient.

In the next case study, we will examine a text that interacts with the readers in a different way by using different strategies.

4.3.2 Case study 2: Controlling Hurricanes (掌控颶風)

The second case study is a feature story written by a scientist who conducts the research first hand, and the story presents his motivation, processes, and results of his research. The interaction with the readers in this text is characterized by its attempts to explain scientific knowledge to lay readers – including giving definitions of scientific terms, using metaphors, and comparing the scientific phenomenon to common things in the readers' daily lives.

The Chinese website has only the first five sub-sections online, so in this case study only the first five sections in ST (2451 words) and TT (2413 words) are included. The sample of both source and target text can be accessed on the website[68].

Example 4.43 is a paragraph which illustrates well how deictics, junctives, personal reference and lexical choices function in a network in the translation to assist the target readers to process a science explanation.

Example 4.43

(ST) To see why hurricanes and other severe tropical storms may be susceptible to

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[68] ST: http://www.sciam.com/article.cfm?articleID=000593AE-704B-1151-B57F83414B7F0000. TT: http://sa.ylib.com/read/readshow.asp?FDocNo=574&CL=4 (Last accessed on 31st October 2007).

human intervention, one must understand their nature and origins. Hurricanes grow as clusters of thunderstorms over the tropical oceans. Low-latitude seas continuously provide heat and moisture to the atmosphere, producing warm, humid air above the sea surface. When this air rises, the water vapor in it condenses to form clouds and precipitation. Condensation releases heat — the solar heat it took to evaporate the water at the ocean surface. This so-called latent heat of condensation makes the air more buoyant, causing it to ascend still higher in a self-reinforcing feedback process. Eventually, the tropical depression begins to organize and strengthen, forming the familiar eye — the calm central hub around which a hurricane spins. On reaching land, the hurricane's sustaining source of warm water is cut off, which leads to the storm's rapid weakening (Hoffman, October 2004).

(TT) 如要理解颶風與颱風等強烈熱帶風暴爲何易受人爲干預的影響，就必須從了解它們的本質與起源著手。颶風（颱風亦同）是誕生在熱帶海洋上的雷雨雲團。低緯度海洋不斷提供熱與水氣給大氣，海面上方因而產生溫暖潮濕空氣。當這些空氣上升，水氣會凝結形成雲或降水。凝結會釋放熱，這些熱就是當初在海洋表面的水，蒸發時所吸收的太陽能量。這所謂的「凝結潛熱」釋放，使得空氣浮力增加，透過此自我增強回饋的過程而繼續上升。最後熱帶低壓會開始組織與強化，形成我們所熟知的「風眼」（無風的中心地帶，颶風會繞其旋轉）。當颶風接觸到陸地時，暖水的補充來源被切斷，其強度因而迅速減弱。(Cai, November 2004).

(BT) In order to understand why severe tropical storms such as hurricanes and typhoons are susceptible to human intervention, [one] needs to start from understanding their nature and origins. Hurricanes (like typhoons) are clusters of thunderstorms growing over the tropical oceans. Low-altitude seas continuously provide heat and moisture to the atmosphere, warm and humid air is therefore formed above the sea surface. When this air arises, the water vapor will condense [and] form clouds and precipitation. Condensation will release heat, this heat is the solar energy that the water at the ocean surface absorbs when [it] evaporates. This so-called "latent heat of condensation" increases buoyancy, through this self-reinforcing feedback process to ascend still. Eventually, the tropical depression will begin to organize and strengthen, forming the "wind eye" that we are familiar with (the windless central hub, around which a hurricane spins). When the hurricane reaches land, the sustaining source of warm water is cut off, its force thus rapidly being weakened.

The most noticeable shift in this extract is the lexical choice: two instances of *hurricanes* are translated as *hurricanes and typhoons* and *Hurricanes (like typhoons).* The word *typhoon* also appears in the subtitle in the Chinese article, although the title remains unchanged. It is clear that typhoon is specified in the translation because the target readers are more familiar with typhoons than hurricanes. The word typhoon helps the readers to recall all their experiences related to typhoons, which they can then relate to the research on hurricanes.

Another device that constructs solidarity with the readers is the addition of *women* (1PP) in *the "wind eye" that we are familiar with.* The "wind eye" is the Chinese expression of the eye of typhoon, and in this case the translator makes the assumption that the target readers should be familiar with this term. This is also a gesture to appeal to the knowledge shared between the writer and the readers, so the readers are not treated as complete outsiders in the texts. The use here of quotation marks, as well as in many other instances (such as "*latent heat of condensation*" in this extract), however, signals that these terms have scientific specialty in Chinese. These terms may also be technical in English, but in the source text their specialty is not emphasized by the quotation marks. In this sense, the translation presents the text producer as being an expert in science who, though trying to be close to the readers, still uses specialized terminology.

The authoritative presence of the text producer can also be observed from the frequent addition of devices of explanation in the texts - the causal junctive (*therefore*), and the proximal deictic that makes the explanation explicit (*this heat is...*). The shifts towards the explicitation of causal junctives are frequent in the translation, occurring mostly when the formation of a scientific phenomenon is explained, as in this example. It is pointed out in the discussion in 4.4.3 that junctives, especially causal junctives, often involve subjective interpretation by text producers. In this text, the translator does not only use junctives to specify a relationship between propositions, she (or the editor) also sometimes adds her own explanatory words in the translation, and very often the link between explanatory phrases is supplied by a proximal demonstrative reference to the previous sentence. An example is *"<u>this</u> heat is the*

solar heat that..." in the translation. This phrase is given as an explanation of the word "heat" in the previous clause. In the source text, the explanation is implicitly introduced by a hyphen, which is a convention in the English language so that the English readers would understand that the hyphen serves an explanatory function (like a colon on other occasions). By contrast, the translator adds a proximal deictic, and also makes the explanation more explicit by turning the transitivity into a relational process, a structure often used for definition.

In other places in the text, appositive junctives such as *yiji* (meaning *i.e.*) are also found, as in example 4.44, below.

Example 4.44

(ST) In an analogous fashion, our challenge is to find just the right stimuli- changes to the hurricane- that will yield a robust response that leads to the desired results (Hoffman, October 2004).

(TT) 相似地，我們的挑戰便是找出能產生穩定反應的正確刺激（亦即對颶風的改變），從而達到我們的需求。(Cai, November 2004)

(BT) Similarly, our challenge is to find the right stimuli that will yield a robust response (i.e. changes to the hurricane), leading to our desire.

The addition of an appositive junctive in this example is also related to an explanation added by the translator. The link between the main clause and the inserted clause is made more explicitly by the appositive junctive in the translation. The appositive junctives and other explanatory indicators discussed in the previous examples - analogy (typhoon), causal junctives, deictics - form a network of explicit explanation provided by the translator for the target readers.

These strategies of explicit explanation can be broadly categorized as information-oriented interactive strategies, according to the discussion in 2.2.1 (following Thompson and Thetela 1995). The translation anticipates that the readers may have problems with the cause-effect relationship in the explanation of science, and therefore adds causal, appositive junctives, and even provides more explanations. Although these are regarded as reader-friendly signals (by Hoey 1983, for example),

as discussed in 4.2.3, the translators also restrict the target readers' freedom of interpretation and this may enhance authoritative attitudes in the text.

4.3.3 Discussion

When comparing the two case studies, it is found that the translators do not make the same translation shifts in each text. The pattern differs according to the rhetorical purposes (realized through text-type, sub-genres, etc.) of the source texts, and the interactive relationship that the translators want to establish with the target readers.

The interaction in case 1 in the source text is characterized by the writer's presence in the text and intimate conversational style with the readers (i.e. function-oriented interaction, see 2.2.1), and the shifts taking place in the translation are found to be mostly related to this aspect - explicit personal reference, deictics, hedges and informal tenor that are related to the explicit attitude of the writer in the argument. The high frequency of addition of junctives or first personal plural reference, however, is not seen in this translation and this is likely to be related to the fact that they contribute little to the desired rhetorical purposes in the translation. On the other hand, the addition of discourse deictics, causal and appositive junctives, and explanatory phrases are the salient translation shifts in the second case study. These devices are related to the fact that the interactive dimension in the text is mostly information-oriented, i.e. how the writer anticipates the readers' difficulty in comprehension and tries to make explicit signals in the texts to facilitate the process of reading.

Of course, a text involves different interactive purposes - never simply information - or function-oriented purpose. As already pointed out in 2.2.1, the two purposes of interaction interweave to form a complete interaction. However, the case studies here endeavour to demonstrate that the main interactive purposes differ from one text to another, and the interactive strategies adopted by the translators also seem to accord with the rhetorical purposes of each text.

4.4 Conclusions

This chapter has demonstrated that the study of the translation shifts of deixis, personal reference, junction and hedges can show the translator's strategies to interact with the target readers. The frequencies of the four selected interactive features in SA-

E and SA-TC, and the number of translation shifts taking place are presented. The major trends identified at this stage were deictic shifts towards proximity, personal shifts towards first person plural references, junctive shifts towards explicitness in adversative, causal and conditional categories, and relatively few shifts of hedges.

Interaction in written texts was defined in section 2.2 as the presence of the writer's attitudes and influence from the readers. In 4.2, the qualitative analysis followed this definition to examine the major trends observed in 4.1, in terms of their significance with respect to writer-reader interaction. The increased number of deictics in the translation is often found to make coherence explicit, and also to reduce the spatial distance from the target readers. It is suggested that the shifts towards first plural personal reference are a strategy to strengthen solidarity with the readers and to invite their participation in the process of science making. The trend of explicit junction can be regarded as a friendly gesture to the target readers - to make the coherence clearer, but it can also be taken as the writers' imposition of their own interpretation of the source texts on the target readers. Finally, although the shifts of hedges are less clear than the other features, they showed how the translators hesitate when they intervene by presenting their voice (for the purpose of explanation, etc.) in the translations.

We argue here that the four selected features show a consistent pattern of the translator's active intervention in the process of communication with the target readers. It is suggested at various points that the shifts can be the result of their consideration for the target readers' familiarity with the genres and the different backgrounds of the source text readers. In the translator-reader interaction, the translators very often present their attitudes in the texts and exploit the four selected features in various ways to encourage the readers' participation.

In 4.3, two case studies were conducted to show that within the main trends identified in the translated corpus, each text, however, uses interactive features differently in order to fulfil its communicative purpose. The translators also adjust their strategy of translation in accordance with the purpose of the source text. Therefore, although the overall trend is a more active interaction in the translation, how the translator actually interacts with the target readers depends on the text type and genre of the text.

CHAPTER FIVE
INTERACTION AS THE FEATURE OF THE NEW GENRE : FINDINGS IN THE COMPARABLE CORPUS

In this chapter, the focus shifts from the relationship between the source texts (SA-E) and the target texts (SA-TC) to the relationship between the translations (SA-TC) and the non-translations (SA-NTC) in the target culture. The objective in Chapter 5 is to investigate the potential influences of translation practice on the non-translated texts, and in the following we will focus on the similarities or differences of the uses of the selected interactive features between SA-NTC and SA-TC, and between SA-NTC and SC-SCI. Section 5.1 presents the findings of quantitative analysis of deixis, personal reference, junction, and hedges in the comparable corpus. The selected features investigated here will follow the list of Chinese features in section 4.1. Section 5.2 will be devoted to the in-depth analysis of these selected interactive features in texts, and the analysis will be related to the discussion of effects and functions of these features in SA-TC in 4.2. Two case studies regarding degree of influence from the translation practice on individual texts will be presented in 5.3. In Section 5.4, a summary of the findings will be presented.

5.1 Quantitative Analysis in the Comparable Corpus

This section compares the frequency of the four selected interactive features in the three Chinese comparable corpora. The objective is to identify the frequency of interactive features in SA-NTC - whether it is closer to SA-TC or SC-SCI, - and to find the quantitative evidence of the potential influence or non-influence of the translation practice on the non-translations.

To present the significance of differences among the three Chinese corpora, we apply a statistical tool called the log-likelihood test[69] here. The tool compares the number of tokens and their percentage in the corpora and then identifies whether differences among the corpora are statistically significant. The symbol [+] in the statistics indicates that the tokens in SA-NTC have a higher frequency in relation to the other corpus, and [-] indicates a lower frequency. The number following the plus or minus

[69] A brief introduction can be referred to in 3.3.1.

is the log-likelihood value (LL value). The higher the LL value is, the more significant the differences between the two corpora are. An LL value of 3.84 or higher is equal to $p<0.05$, the universally accepted value for statistical significance; and a value of 6.63 or higher is significant at $p<0.01$[70]. In this study, any feature receiving a value of +3.84 and higher or -3.84 and lower will be classified as an indication of significant difference between SA-NTC and the comparable corpora (SA-TC and SC-SCI).

5.1.1 Deixis

This section presents the quantitative findings of deixis in the three Chinese corpora. The list of Chinese deictics investigated here is the same as that in the analysis of the parallel corpus (the list of deictics can be referred to in 4.1.1).

Table 5.1 presents the total number of occurrences of demonstratives, place and time adverbs in SA-TC, SA-NTC and SC-SCI. The number of proximal and distal deictics is calculated separately first, and then at the bottom a sum of deictics and their frequency in the whole corpus is given.

		SA-TC (109,985 words)	SA-NTC (82,804 words)	SC-SCI (566,717 words)
Proximal	Demonstratives	1167	630	1512
	Place Adverbs	36	20	16
	Time Adverbs	14	7	14
	Total	1217(1.10%)	657(0.79%)	1542(0.27%)
Distal	Demonstratives	227	88	337
	Place Adverbs	5	3	9
	Time Adverbs	60	49	48
	Total	292(0.27%)	140(0.17%)	394(0.07%)
Total number of deictics (percentage of tokens in the corpus)		1509 (1.37%)	797 (0.96%)	1936 (0.34%)

Table 5.1 Total number of deictics in the comparable corpora

The table displays a consistent pattern of higher proximals than distals. As was discussed in 4.1.2, proximals are the preferred discourse deictics in Chinese written

[70] To calculate the value, the analysts simply have to type the number of occurences for one word and the corpus sizes in the calculator (available at http://ucrel.lancs.ac.uk/llwizard.html, last accessed on 13 May 2008). The calculator then generates the log-likelihood value by comparing the frequencies between the two corpora. See Rayson *et al.* (2004) for further details.

texts, so this consistency should not be surprising. However, within this consistent pattern, differences are also noticed. Although proximals have a higher frequency in the three corpora, the degree of different frequencies between proximals and distals in the three corpora varies. Compared with SC-SCI, we can see that in SA-TC and SA-NTC, the percentage of proximals is much higher than those of distals. These figures show that in SA-TC and SA-NTC the frequency of use of proximals and distals is more significantly different, and the role of proximals is more prominent in these two corpora. This finding indicates that the use of proximals is a unique feature in the Chinese SA corpora, and also indicates potential influence from SA-TC to SA-NTC.

Concerning the total number of deictics in the corpora, SA-NTC again shows a frequency closer to SA-TC than to SC-SCI. SC-SCI uses only 0.34% of deictics, whereas the frequencies in SA-TC (1.37%) and SA-NTC (0.96%) are much higher. In this comparison, we again see the number in SA-NTC situated between the translations and the Chinese norms, but much closer to the translations. We may suggest that the second unique pattern of deictics shared by the two SA corpora is their much more frequent use of deictics than may be found in other Chinese science writings.

In table 5.2 below, the log-likelihood test is used to examine the degree of differences between SA-NTC and SA-TC, and SA-NTC and SC-SCI.

	SA-NTC & SA-TC	SA-NTC & SC-SCI
Proximal	-48.59	+445.11
Distal	-20.17	+69.76
All Deictics	-67.66	+512.04

Table 5.2 Log-likelihood values of key deictics in the comparable corpora

In the first content column, all the figures are in [-] value, which means that SA-NTC uses relatively fewer proximals, distals, and overall deictics than does SA-TC. In the second content column, all the figures are in [+], reflecting that SA-NTC has a

relatively higher frequency of proximals, distals, and the overall number of deictics than SC-SCI does. This observation is consistent with what we saw in table 5.1.

The numbers following [+] and [-] indicators are related to the degree of significant variance. The higher the number is, the larger the differences between the two corpora are. The first content row shows that the difference of SA-NTC from SC-SCI is ten times larger than its difference from SA-TC. The figures indicate that, in terms of the frequency of proximal deixis, SA-NTC has much more similarity with SA-TC than with SC-SCI. In the second content row, the figures are relatively low when comparing with the first row. This finding indicates that the differences between the frequencies of distals in the three corpora are less significant than those in the proximals. Even so, SA-NTC still has a closer frequency of distals to SA-TC than to SC-SCI. The last row shows that the occurrence of deictics in the SA-NTC is also closer to SA-TC than to SC-SCI, which is reasonable, since there is a consistent pattern of less difference in the frequencies of proximals and distals between the two SA corpora.

To conclude, there are two main findings in this section. (1) The main difference among the three corpora is in the frequency of proximals, while there is relatively little variance in the distals. (2) Considering the overall frequencies of deictics in the corpora, SA-NTC shows more similarity with SA-TC than SC-SCI. Based on these two observations, we may suggest that SA-NTC has received influence from translation practice by using deictics more frequently - proximals in particular, - and this is a departure from the Chinese norm. Based on these conclusions from the quantitative evidence, the qualitative analysis of deixis in the three Chinese corpora will be explored further in section 5.2.

5.1.2 Personal Reference

This section sets out to compare the frequency of personal reference in the three comparable Chinese corpora. In 4.1.2 we have seen that SA-TC omits only few personal references from SA-E, and the frequency of personal references in SA-TC is much higher than in SC-SCI. In the analysis below we would like to see whether the

high frequency of personal features is also found in SA-NTC or whether SA-NTC displays more similarity with SC-SCI.

Table 5.3 shows the occurrences of personal references in the three corpora.

	SA-TC (109,985 words)	SA-NTC (82,804 words)	SC-SCI (566,717 words)
1PS	448 (0.41%)	248 (0.30%)	670 (0.12%)
1PP	368 (0.33%)	245 (0.30%)	469 (0.08%)
2P	152 (0.13%)	95 (0.11%)	288 (0.05%)
Total	968 (0.88%)	588 (0.71%)	1327 (0.23%)

Table 5.3 Total number of personal references in the comparable corpora

Table 5.3 shows that SA-TC has the largest percentage of personal references, SA-NTC the second, and SC-SCI the lowest. This tendency is observed in 1PS, 1PP, 2P and the total number. The percentage figures in SA-NTC are all much closer to those in SA-TC than to those in SC-SCI, which suggests the potential influence in SA-NTC from the translation practice. 1PP especially shows the largest differences between the three corpora, and 2P shows the lowest number of differences. An interesting finding in this table is that 1PP is used almost as frequently as 1PS in SA-NTC, which is not seen in SA-TC and SC-SCI; this suggests the important role of 1PP in SA-NTC.

To show clearly how significant the difference is between the three corpora statistically, we again draw on the help of log-likelihood test.

	SA-NTC & SA-TC	SA-NTC & SC-SCI
1PS	-15.49	+133.24
1PP	-2.24 (not significant)	+218.86
2P	-2.05 (not significant)	+40.81
Total	-17.12	+422.18

Table 5.4 Log-likelihood values of 1PS, 1PP and 2P in the comparable corpora

We can see that the numbers in column 1 are much smaller than in column 2, which means that the difference of SA-NTC from SA-TC is much smaller than from SC-SCI. Also, the numbers in column 1 are all of negative value, whereas the numbers in column 2 are positive values, indicating that SA-NTC has a lower frequency of personal references than SA-TC, but higher frequency than SC-SCI. These results are in line with the observation from table 5.3 that the frequency of personal references in SA-NTC is closer to SA-TC and farther from that of SC-SCI. Table 5.4 in particular shows that the differences between SA-NTC and SA-TC in 1PP and 2P are below the critical value 3.84, which means these two differences can be regarded as statistically insignificant[71].

Table 5.4 also shows that SA-NTC is most different from SC-SCI in the frequency of 1PP. SA-TC and SA-NTC use similar percentage of 1PP (with no statistical significance) but the log-likelihood value between SA-NTC and SC-SCI is the largest in this table. This indicates that a significantly higher frequent use of 1PP is characteristic of SA-NTC, which is against the Chinese norm. In 4.1.2 (table 4.4), it is suggested that SA-TC adds a large number of 1PP, and the total number of 1PP in the target texts is even slightly higher than in the source texts. Therefore, the role of 1PP again proves to be significant in both SA-TC and SA-NTC.

On the other hand, the three Chinese corpora have the fewest differences in the use of 2P. As stated above, SA-NTC and SA-TC have no significant differences, and the likelihood value between SA-NTC and SC-SCI is the smallest among the three personal references investigated. The analysis in 4.1.2 also shows that the translation has more omissions than additions of 2P. The data in this table show that, concerning the use of 2P, the two SA Chinese corpora are least different from the Chinese norm.

The category between the two extremes is 1PS. SA-NTC uses significantly fewer 1PS than SA-TC, but its frequency is still much higher than in SC-SCI. This suggests that SA-NTC may have received some influence from SA-TC, but the influence is not as strong as in the other two categories.

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[71] More details can be found in the explanation in the introduction in 5.1.

To conclude, our main observations in this section are: (1) SA-NTC displays higher similarity in all of the three person categories with SA-TC than with SC-SCI. (2) A more frequent use of 1PP is characteristic of SA-NTC and SA-TC, differing significantly from the norm in SC-SCI. (3) 2P seems to be the category in which the two SA Chinese corpora receive less influence from the ST and are more constrained by the preference in the Chinese writings. These are the three observations we identified through the quantitative analysis in this section, and we will investigate these personal categories more closely in 5.2.2.

5.1.3 Junction

In this section, we will investigate the distribution of the representative junctives in the three comparable Chinese corpora. The list of representative junctives investigated here is the same as the Chinese junctives investigated in the parallel corpus (details of the process of selection can be referred to in 4.1.3). The numbers of representative junctives in each semantic category are first presented, and then a total of six categories will be compared among the three corpora to identify the similarities or differences between the three.

First, the frequency of representative junctives is presented in tables 5.5-10, in the order of additive, alternative, adversative, causal, hypothetical, and temporal. In each table, the raw figures of individual junctives in absolute numbers are first presented, and in the last row the total number of junctives in each category is accumulated and expressed as a percentage of the total words in the whole corpus.

	SA-TC	SA-NTC	SC-SCI
而[72]	305	227	987
與	335	346	787
和	227	199	948
並	137	66	520
及	139	119	1038
以及	109	58	167
而且	76	52	140
並且	26	10	110
且	20	16	114
此外	13	10	72
total	1387(1.26%)	1103(1.33%)	4910(0.86%)

Table 5.5 Additive junctives in the comparable corpora

	SA-TC	SA-NTC	SC-SCI
或	190	118	564
或是	56	9	88
或者	14	5	29
total	260(0.24%)	132(0.16%)	681(0.12%)

Table 5.6 Alternative junctives in the comparable corpora

[72] The count of *er* here is different from that in the parallel corpus. As explained in the qualitative analysis (4.2.3), *er* is a multifunctional junctive which can link additive, adversative and causal relations. In the parallel corpus we did not include *er* as an intra-sentential causal link (such as 因... 所以...) because it functions in a different way from the English *and* and will cause incorrect statistics when counting the shifts from *and* into Chinese *er*. But here, because the reference corpus does not make this distinction, in order to ensure the comparability of the three corpora, we include all the instances of *er* in the three corpora. Therefore the number of *er* in SA-TC here is higher than the number in the analysis 4.1.3.

	SA-TC	SA-NTC	SC-SCI
但	261	142	594
不過	127	45	123
但是	101	127	229
雖然	64	30	148
然而	44	24	65
可是	20	29	47
total	617 (0.56%)	397(0.48%)	1206(0.21%)

Table 5.7 Adversative junctives in the comparable corpora

	SA-TC	SA-NTC	SC-SCI
因爲	133	111	331
所以	52	31	193
因此	104	85	322
因	31	25	158
由於	49	34	179
total	369(0.36%)	286(0.35%)	1183(0.21%)

Table 5.8 Causal junctives in the comparable corpora

	SA-TC	SA-NTC	SC-SCI
如果	133	78	265
若	15	10	127
的話	23	8	15
total	171(0.17%)	96(0.12%)	407(0.07%)

Table 5.9 Hypothetical junctives in the comparable corpora

	SA-TC	SA-NTC	SC-SCI
當	74	48	119
的時候	13	8	46
total	87(0.08%)	56(0.07%)	165(0.03%)

Table 5.10 Temporal junctives in the comparable corpora

The six tables display a consistent pattern in that SA-TC and SA-NTC have a closer percentage of junctives. The representative junctives in alternative, adversative, causal, hypothetical and temporal categories have a higher frequency in SA-TC than in SA-NTC; only the key additive junctives have a similar frequency in SA-NTC and SA-TC. However, overall the discrepancy between SA-NTC and SA-TC is smaller than that between SA-NTC and SC-SCI. The results suggest that not only is explicit junction a feature belonging to the translations, but it also characterizes the non-translations.

Next, the frequency of the sum of junctives in the individual tables is further compared. The log-likelihood value is also calculated in order to demonstrate more clearly the similarities or differences between SA-NTC and the other two Chinese corpora.

	SA-NTC & SA-TC	SA-NTC & SC-SCI
Additive	+1.84	+151.88
Alternative	-14.11	+8.28
Adversative	-6.02	+169.83
Causal	+0.14	+52.55
Hypothetical	-5.42	+16.10
Temporal	-0.85	+25.51

Table 5.11 Log-likelihood values of key junctives in the comparable corpora

The table confirms the results above, that SA-TC and SA-NTC share higher similarity in junctive frequency. The log-likelihood values between the two SA corpora are smaller (except alternative junction) than those between SA-NTC and SC-SCI, and several values (additive, causal, and temporal) between the two SA corpora are below the statistically significant number. On the other hand, the values in the second content column are much larger and indicate a significant difference between SA-NTC and SC-SCI. Among the six categories, the differences are most significant in adversative, additive and causal. This suggests that the three junctive relations are more often linked without explicit junctives in the Chinese norm than in the SA

Chinese translations and non-translations. The analysis in 4.1.3 has shown that the Chinese translators add more adversative and causal junctives in the translation, which is related to the result of high adversative and causal junctives here. However, in 4.1.3 the translators are found to have omitted many additive junctives, and in the analysis it is suggested that the translators are constrained by Chinese norms. Here, even though the Chinese translators omit a number of additive junctives, but when comparing with the Chinese norm, the number of junctives relayed from the source texts is still higher.

In conclusion, the statistics here indicate that explicit uses of junctives appear in all the six junctive categories, especially significant in additive, adversative and causal groups. Also, SA-NTC shows close junctive patterns with SA-TC, which also uses more explicit junctives than the reference corpus. This is an important finding: that explicit uses of junctives are not only a product of translation but are also seen in non-translation. How the non-translations display a more explicit use of junctives than the Chinese norm does will be the subject of further discussion in 5.2.3.

5.1.4 Hedges

This section will present a comparison of hedges in the three Chinese corpora. The process of identifying and selecting representative Chinese hedges in the corpus has been explained in 4.1.4, and the analysis in this section is based on the same list.

First, the occurrences of each selected hedge and their percentages of the whole corpus words are presented.

Key Hedges	SA-TC 109,985	%	SA-NTC 82,804	%	SC-SCI 566,717	%
可能 *keneng* [possibly]	230	0.21	145	0.18	241	0.04
約 *yue* [about]	43	0.03	30	0.04	63	0.01
也許 *yexu* [maybe]	38	0.03	21	0.03	34	0.006
幾乎 *jihu* [almost]	37	0.03	29	0.04	52	0.01
或許 *huoxu* [maybe]	36	0.03	17	0.02	34	0.006
似乎 *sihu* [seem]	32	0.03	33	0.04	39	0.007
大約 *dayue* [about]	28	0.03	17	0.02	15	0.003
看來 *kanlai* [appear]	24	0.02	9	0.01	6	0.001
大概 *dagai* [roughly]	18	0.02	7	0.01	15	0.003
Total	496	0.45	308	0.37	499	0.09

Table 5.12 Total number of selected hedges in the comparable corpora

The figures displayed in table 5.12 show that the frequency of the total selected hedges in SA-NTC (0.37%) is closer to the figures in SA-TC (0.45%) and much higher than in SC-SCI (0.09%). This trend is consistent with the nine hedges investigated here - some show greater discrepancy than others, but all conform to this pattern. The significance of this finding is that it can be regarded as quantitative evidence of a feature of a new genre revealed in SA-NTC arising from influence of the translation practice and a departure from the norm of scientific writing in the target language.

Because the percentages in comparison in table 5.12 are very small numbers, the degree of difference may not be easily detected. In table 5.13 we use the log-likelihood values to present more clearly the differences of SA-NTC from SA-NTC and from SC-SCI.

	SA-TC & SA-NTC	SA-NTC & SC-SCI
可能 *keneng* [possibly]	-2.84	+152.08
約 *yue* [about]	-0.10	+23.81
也許 *yexu* [maybe]	-1.33	+22.64
幾乎 *jihu* [almost]	+0.03	+27.98
或許 *huoxu* [alternative]	-2.64	+14.38
似乎 *sihu* [seem]	+1.60	+47.27
大約 *dayue* [about]	-0.50	+29.89
看來 *kanlai* [appear]	-3.48	+18.52
大概 *dagai* [roughly]	-2.39	+5.41
Hedges	-12.89	+331.81

Table 5.13 Log-likelihood values of key hedges in the comparable corpora

Table 5.13 shows that in the first content column, all the figures are below the critical value of 3.84, meaning statistically insignificant. Therefore, statistically speaking, SA-TC and SA-NTC are almost identical in terms of the frequency of these selected hedges. On the other hand, all the figures in the second content row are beyond the standard of significant value. Among them, *keneng* is the most frequent hedge in the three corpora, and also has the largest number of differences between the SA corpus and the reference corpus. Overall, a more frequent use of hedges than the Chinese norm is found to be a feature shared by both the SA corpora, and may suggest potential influence from the translation practice on SA-NTC.

In conclusion, the findings in this section indicate quantitative evidence contributing to the possibility of the creation of a new genre in terms of the frequency of hedges in SA-NTC, which has departed from the Chinese norm (as shown in SC-SCI) and moved towards the pattern in SA-TC. How the similarities or differences the patterns actually display in the texts will be the subject to be discussed further in 5.2.4.

5.2 Qualitative Analysis of the Comparable Corpus

The aim of the qualitative analysis is to bring the significant results found in the quantitative analysis into further contextual examination. Rather than counting the frequencies, the focus in this section will be on the typical or non-typical uses of interactive features in the texts. The discussion will be based on examples located in

the texts and the analysis will draw co-textual and contextual factors into explanation. By examining the patterns of the selected interactive features used in the three Chinese corpora, it is hoped that we can build a clearer picture of how the writers in each corpus conduct interaction with the readers. We will focus in particular on the strategies used by the writers in SA-NTC to see whether they adopt a strategy similar to or different from the translator's strategies discussed in 4.2.

5.2.1 Deixis

The quantitative evidence in 5.1.1 showed that a higher frequency of deictics - proximals in particular - than the Chinese norm is a feature shared by SA-TC and SA-NTC. The frequency of deictics in SA-NTC (0.96%) is lower than in SA-TC (1.37%), but is still higher than in SC-SCI (0.34%). On one hand, SA-NTC seems to share the pattern with SA-TC, but on the other hand, it is also constrained by the Chinese norm. This section will examine qualitative evidence of the potential influence of the translation practice on the texts in SA-NTC.

As discussed in 4.2.1, the use of proximals is a preferred choice for endophoric reference in written texts. It is not surprising to see that both SA-NTC and SC-SCI use proximals for such functions. Example 5.1 below is taken from SA-NTC.

Example 5.1

低溫和乾燥是一般種子蒐藏庫的基本處理方式，但是再怎麼講究，多數植物種子的壽命終究有限。每隔個幾年，當測試發芽率偏低的時候，就得汰換，重新冷藏一批新種子。這種情形若是也發生在厚葉龍膽身上，那麼此物種的永續保育就更難了。(Li, July 2007).

(BT) Low temperature and dryness are the basic conditions in which to preserve seeds, but no matter how careful [one is] with the situation, most of the seeds of the plants have a limited age. Every few years, when the germination rate is low, replacements are needed, [and] a number of new seeds need to be preserved. If this situation happens to Gentiana tentyoensis Masamune, sustainable preservation of this species would be even more difficult.

In this example, *this situation* refers back to the preceding description of the preservation of seeds, and makes a link between the general situations of preservation of seeds to the specific difficulty of the preservation of rare plants. As we pointed out in previous discussions (Zhu *et al.* 2001:32), *zhe* is preferred in referring back in written Chinese texts. The use of the phrase *this situation* makes coherence explicit.

Although proximals are unmarked endophoric references in the Chinese norm, it is nevertheless a unique feature in SA-TC and SA-NTC to use a proximal to point out a macro-level textual cohesion - such as a problem-solution pattern as in example 4.2 in 4.2.2.1. In SA-TC, one of the salient features of proximals is to function as discourse deictics pointing out textual structures. In such cases, proximals are often collocated with signals that point out the textual relationship between propositions. For example, a linking phrase like *this is <u>why</u>* points out a causal-effect pattern, or a phrase like *regarding this <u>problem</u>* makes a problem-solution pattern explicit. Therefore, the translators in SA-TC not only point out **there is coherence** between propositions, but even point out **what kind of coherence** it is. When discussing the translator's strategy in 4.2.1, it is asserted that in the genre of popular science the readers rely on signals of macro-level cohesion to make sense out of meanings of words and phrases (Myers 1991:16). Such uses of proximals to point out explicitly what kind of cohesion exists in the texts, although they can also be identified in SA-NTC, are much fewer in number. 5.2 below is an example.

Example 5.2

鯊魚有四億年的演化史，無數的鯊魚牙落在海床上化成了石。<u>這也就是爲什麼</u>在自然野趣禮品店裡，花不到 100 元，就可以買到一顆千萬年老的精緻鯊魚牙化石了。(Li, September 2005).

(BT) Sharks have a four-hundred-million-year history of evolution, numerous shark teeth fell on the seabed and fossilised. <u>This is why</u> in the souvenir shop a ten-million-year old fossilised shark tooth costs lest than one hundred dollars.

Example 5.2 contains two sentences in a cause-effect relationship. The phrase *This is why* does not affect the propositional meaning, but functions to point out a connection between the two. Without the phrase *this is why*, the history of the shark's evolution

can still be understood by the reader as the reason for the cheap price of sharks' teeth; however, the existence of this phrase highlights the writer's presence in the texts and the imposition of their interpretations on the readers' process of reading. This kind of interactive strategy, which seems to be redundant in semantic meaning, can be regarded as a feature of the genre of popular science.

This kind of pattern of proximals collocating with words specifying the type of cohesion in the immediate co-text occurs much less often in the concordances of *zhe* in SC-SCI. Although proximals are also used for endophoric references in SC-SCI, they rarely collocate with expressions that make explicit the relationship between propositions. Therefore, the use of proximals to make textual structure explicit is a particular interactive feature in SA-TC, and is shared by SA-NTC but not other Chinese science writings.

Another marked use of proximals, as discussed in 4.2.2, is to visualize a referent in the distance. The effect of referring to a physically distant object as if it were close to the utterance of the context can stimulate readers to use their imagination and bring them closer to the referent. However, such examples are also rare in SA-NTC and SC-SCI. Example 5.3 is taken from SA-NTC.

Example 5.3

我當然是在現場就做起標本，用針筒把福馬林注入蟹殼內，再固定好附肢。旁邊總圍著一群漁婦、小孩，看這年輕人表演，也一起吸進福馬林氣。這氣味還一路瀰漫在火車車廂內，進了台大實驗室，也回家和親友分享。真是罪過啊！但當時哪知道福馬林是致癌物？(Li, July 2005).

(BT) I of course started making a specimen on the spot, using a syringe to inject formalin into the crab shell and fixing appendages. Around were always a group of fisherwomen and children to watch this young man's performance and also together to breathe in the smell of formalin. This smell even immersed inside the railway car all the way back to the lab in National Taiwan University, and back home to be shared with friends and families. What guilt! But then who knows that formalin can cause cancer?

Example 5.3 is a narration of a young scientist's experience in making a specimen with the toxic chemical formalin. In this passage, *This smell,* referring to the formalin, is an interesting use. It can be regarded as an endophoric use referring to the word *formalin* in the preceding sentence and therefore an unmarked use. Nevertheless, because the sentence is a description of a scene which happened in a railway car, the proximal in *this smell* also be regarded as a deictic projection, i.e. presenting the smell as if it were close to the readers. From a physical referent point of view, *that smell* should be regarded as the unmarked choice, because in the description it is a recall of a past experience and the temporal point is specified by the distal temporal adverb in the final sentence *then*. The proximal here not only is a cohesive device, but also leads the readers into the story and makes them feel *this smell*, as if the story were taking place right now. This kind of marked use of a proximal for visualization is seen less in SA-NTC than in SA-TC. With reference to the SC-SCI, from the concordances it is difficult to identify such use of visualization in proximals; instead, distals seem to be used more often for narratives of distant objects, as will be seen later, in the discussion of distals.

In terms of the function of distals, we have found in SA-TC that they are mostly related to the expression of detachedness — physical or psychological. In the SA-NTC, such tendencies are observed.

Example 5.4

他也一直不喜歡 1980 年代以來粒子物理大搞的唯象理論，認爲那不會是最後的理論。(Jiang, November 2002).

(BT) He did not like the phenomenological theory popular with particle physics since 1980 either, regarding that as not the final theory.

In example 5.4, *that* refers back to the phenomenological theory in the previous sentence. It is clear from the context that the characters possessed a detached attitude towards the theory, and the distal demonstrative can help to highlight this kind of effect. But again, compared with SA-TC, such trends are less clear in SA-NTC. In SA-NTC, distals are not restricted to implications of detachedness, as example 5.5 illustrates.

Example 5.5

那碧海晴天、紅豔日頭，那朝霞裡翱翔天際的威武飛鷹，每年此時都在凌霄亭上感動了許許多多鳥人的心…(Wang, November 2003).

(BT) That blue sea and sunny sky, red and bright sun, that mighty eagle flying in the edge of the morning mist, touch many birdwatchers' hearts at Ling-Xiao Pavilion around this time every year…

The example presents a description of a beautiful scene in a story of bird watching. The distal in this description refers to the beautiful sea, sky, sun, and eagles in the sky in the distance. This context has no indication of detachedness; on the contrary, the referents lead to emotional involvement - as indicated by the following sentence *"touch many birdwatchers' hearts"*. The use of distal proximals here obviously reflects physical distance rather than the psychological distance. There is no definite guideline as to when the writer should choose to reflect the physical or psychological distance, but when the writer chooses to be guided by the psychological distance, it often results in a different effect on writer-reader interaction, since the writer's attitude is more clearly presented in their textual choices.

The tendency to reserve distals in the context of detachedness is even less obvious in the reference corpus. In SC-SCI, distals do not show such a trend towards restricted function but have a wider range of functions.

Example 5.6

…一位七十歲老醫生對疾病驚恐和掙扎的坦白陳述，對醫療倫理的深切反思，想重新界塑人與疾病之間，以及病人與醫護人員之間的關係。那種人性的光輝與智慧，使人感受溫暖與鼓舞。(SC-SCI).

(BT)…a frank narration of a seventy-year-old doctor's fear of and struggle with illness, a deep reflection on medical ethics, and an attempt to reshape the relationship between human beings and disease, and between patients and doctors. That kind of brightness and wisdom makes people warm and inspired.

In example 5.6, the choice of the distal reference *that kind of* is unmarked because the brightness and wisdom referred to is not in the spatial-temporal centre where the writer is located, but in a book, a textual world distant from the writer and the reader. Unlike in SA-TC, in which we see a tendency of making marked choices by pointing towards a distant referent with proximals, the writers in SC-SCI tend to make unmarked choices in such cases. This difference suggests that, compared with those in SC-SCI, the writers/translators' choices of deixis in the SA corpora are more frequently related to psychological distance. In this example, if the marked effect is desired, the writer may as well choose a proximal demonstrative to bring the spotlight on the emotional effect of "brightness and wisdom" and reduce distance between the book, the writer and the readers. Nevertheless, in this example such markedness is not present.

In conclusion, the qualitative finding in this section suggests that the profiles of the functions displayed in SA-TC, which are distinct from those of the reference corpus, can also be found in SA-NTC, but with less clear trends. SA-TC and SA-NTC display a generic feature of using proximals to point out textual coherence and to make visualization in narration. Also, in these two corpora the motivation for using distals tends to be psychological rather than physical distance. These particular features that distinguished the Chinese SA corpora from SC-SCI can be regarded as a unique feature of the emerging genre of popular science in Taiwan. The finding that SA-NTC shares similar patterns with SA-TC is potential evidence of the influence of translation practice on non-translations; however, a less clear trend of interaction in SA-NTC than in SA-TC also suggests that the Chinese writers may still be governed by the Chinese norm to some extent.

5.2.2 Personal Reference

The quantitative analysis of personal reference in 5.1.2 shows that the frequencies of first and second personal references are much closer between SA-NTC and SA-TC than between SA-NTC and SC-SCI. The similarity between the two SA Chinese corpora is particularly salient in the frequency of 1PP and 2P. The frequency of 1PS in SA-NTC (0.30%) is lower than that in SA-TC (0.41%) but is still much higher than in SC-SCI (0.12%). In what follows, the context of occurrences of the personal

references in the three Chinese corpora will be examined based on the discussion of the use of these personal references in the translated corpus in 4.2.2 in order to identify further any potential qualitative evidence of the influence of SA-TC on SA-NTC.

The first category to be examined is 1PP, as it is found to be an important interactive strategy used by the translators, and contributes to the construction of solidarity between translators and readers. Readers are included in the interaction by the use of inclusive 1PP - including the writers and the readers, or the use of 1PP as a generic reference, including everyone.

One use of 1PP is for self-reference to the researchers. This seems to be a common strategy shared by the three corpora. By using a plural reference, the writer minimizes the presence of self and stresses teamwork. The use of the first person plural pronoun in science writing has always been discussed in politeness as an avoidance of FTAs[73] (Myers 1989:7). Example 5.7 below is from SA-NTC.

Example 5.7

若我們針對六起規模大於 6.0 的餘震做觀察，似乎它們大都發生於庫侖應力增加之區域，而同年 10 月 22 日兩起規模大於 6.0 的嘉義地震，其震源位置亦發生於庫侖應力增加的區域（如圖中深度 18 公里之圖示）。(Ma, September 2003).

(BT) If we focus on the six incidences of aftershocks beyond the scale of 6.0 [and] make an investigation, it seems that they happen mostly in the area where the Coulomb stress increases, and the other two earthquakes which took place in Jiayi on October 22 in the same year, also have their centre at the area where the Coulomb stress increases (as indicated in the picture in the depth of 18 km.)

In example 5.7, *women* is an actor conducting the research. 1PP is commonly used as a self-reference by the researcher, to stress the team rather than individual. However, we have also argued in 4.2.2, as in example 5.7, that in the genre of popular science the use of 1PP in the process of science making can be regarded as an inclusion of the readers. The boundary between inclusive and exclusive is not always clear, and

[73] The review of politeness and FTAs can be referred to in 2.2.5.

sometimes both functions can be achieved at the same time (Wales 1996:62). Therefore, the reference of the first person plural pronoun may function as an act of maintaining face in the science community, but may also be regarded as a gesture to involve the readers. Example 5.8 is an extract from SA-NTC.

Example 5.8

程延年等台灣學者從 1998 年起開始和對岸學者跨海合作，目前他們正進一步共同研究樹息龍。這種具有鳥類特徵的樹棲性迷你恐龍，可能將大大改變我們對鳥類飛行起源的看法。(Zhang, November 2002).

(BT) The Taiwanese scholars such as Chen Yan-nian have started cooperation with the scholars on the other side of the strait since 1998; currently they are further conducting a joint research on Epidendrosaurus. This species of mini tree dinosaurs with the features of birds, may largely change how we consider the origin of bird flight.

In this example, *women* is a generic use which refers to all people's views towards the origin of bird flight. In the translation we found many instances of *women* as the translation of indefinite personal references in English[74], and in those circumstances *women* refers not to the writers and the readers but to anyone. In SA-NTC, this kind of use is also commonly found, often to refer to a viewpoint or a question, etc. shared by all human beings.

In SC-SCI, we find that many uses of 1PP appear to perform the generic function and refer to anyone, but when we explore beyond the limited co-text in the concordances, it becomes clear that they tend to refer to a particular group of people rather than all human beings in general. Example 5.9 is one such case.

Example 5.9

凱因斯說過，經濟學家和政治哲學家的思想不管是對的，還是錯的，他們對人類生活的影響都比我們想像的大。事實上，整個人類文明是被這些思想所統治。創造那不可多得的新思想，提出令人耳目一新的新理論，毫無疑問的是我

[74] See example 4.14 in 4.2.2.1.

們回饋社會最重要的途徑。爲了增加研究的生產力，中研院的同仁努力工作，購置精密儀器，聘請研究助理和邀請學者同仁共同合作。(SC-SCI).

(BT) Keynes once said that, whether the thoughts of economists and political philosophers are correct or incorrect, their influence on our lives is much greater than we imagined. In fact, the entire human civilization is governed by these thoughts. To create those valuable novel thoughts, to propose fresh new theories, undoubtedly is the most important way we pay back society. In order to enhance productivity of research, the colleagues in Academia Sinica work hard, purchase sophisticated instruments, recruit research assistants and invite scholars for cooperation.

In the concordances (17 characters each side of keyword), the underlined 1PP seems like a generic use which refers to the entire human race and their contribution to the society. However, a larger co-text gives a clearer picture that refers only to the researchers in the institution. These 1PP can be regarded as exclusive if the readers are not part of the institution. In SC-SCI, *women* has a high frequency of collocation with terms referring to institutions - such as society, school, nation, organizations, - and when *women* collocates with these words they tend to refer only to the insiders of the group. The differences, however, can also be related to the fact that SA aims at public readers, whereas SC-SCI contains a variety of texts which include documents circulated within an institution and therefore address only particular readers. Without the direct access to the context of the texts, we can only broadly conclude from the textual findings that, in the SA corpora, more generic use of *women* meaning any individuals is found than in SC-SCI.

The difference of frequency of 2P between SA-TC and SA-NTC is also statistically insignificant according to the log-likelihood test, which means that the two corpora use 2P with the same frequency. In SA-TC, 2P is found to involve the readers directly by assigning readers the role of actor in the clause, by asking them questions, or by giving them suggestions[75]. The two aspects are also found in SA-NTC, as illustrated in examples 5.10 and 5.11.

[75] See example 4.15, 4.16, and 4.17 in 4.2.2.1.

Example 5.10

前瞻式研究的第一步，你徹底檢索你感興趣的領域的文獻，精讀最新最「熱」雜誌裡最「熱」的文章，搞清楚這個領域裡已解決的和未解決的問題。然後，你開始針對未解決的問題設計自己的實驗。(Pu, May 2003).

(BT) In the first step of prospectus research, you thoroughly search for the literature review in the field that you are interested in, carefully read the "most popular" articles in the "most popular" journal, clearly understand the solved and unsolved questions in this field. Then, you start designing your own experiments targeting the unsolved questions.

In this example, the writer presents the steps of doing research and lets the readers be the actor. The readers are given the role to imagine themselves following the steps and being the researchers. Therefore, the readers are involved in the interaction with the writers.

Another strategy to invite the readers' participation is to ask them questions, or force them to use their imagination by giving them a scenario, as shown in the following example.

Example 5.11

如果你想要運用你的創造力，爲你生活的年代做個見證，甚至對於人性最基本的質素做個深入探討，你會寫一本文學巨著呢，還是編一本字典？(Wu, February 2003).

(BT) If you want to use your creativity, to keep a record of your era, even make an in-depth examination of the most basic nature of human beings, will you write a great literature work, or compile a dictionary?

In this example, 2P is accompanied by the use of the *if* clause and question, and the interaction with the readers is obvious. The readers are guided by the rhetorical strategy to think of the questions and to imagine the scenario.

Although these two functions of 2P are also found in SC-SCI, the overall frequency of 2P in SC-SCI is lower than in the two SA corpora. Therefore, the writers of SC-SCI

address the readers less directly. Another difference is that in SC-SCI, one quarter of the occurrences of 2P are assigned the role of objects. In the 205 instances of 2P in SC-SCI, fifty (accounting for 24.4% of all) are used as an object following a verb, as in example 5.12.

Example 5.12

創意是開啓不可知的未來的鑰匙。激發創造潛力有滾雪球般的效果，它可以改善<u>你</u>的信心，增強<u>你</u>的表現能力，同時幫助<u>你</u>在各種領域獲得成功。(Wu, February 2003).

(BT) Creativity is the key to an unknown future. Stimulation to the potential of creativity can have a snowball effect; it can improve <u>your</u> confidence, strengthen <u>your</u> performance, at the same time help <u>you</u> to gain success in all kinds of fields.

When 2P is used as object, the readers are not invited to be the actor carrying out the activity, as in examples 5.10 and 5.11, but they are the receivers of the process of action. The use of 2P as objects is much less frequent in SA-NTC (6.3%) and SA-TC (13.6%), in which the readers are invited as actors to participate. Compared with the Chinese SA readers, the readers of SC-SCI not only have less chance to be invited by the writers in the texts but they are more often invited to be identified in a passive role in the texts.

The frequency of 1PS in SA-NTC has the biggest difference from that in SA-TC among the three categories of personal references investigated in the corpus, but the frequency is still much closer to that in SA-TC than in SC-SCI.

Comparing the concordances of the key word 1PS in the three corpora, a striking feature distinguishing 1PS in SC-SCI from the two Chinese SA corpora is their frequent collocation with reporting words, such as thinking and agreeing, and this is often related to the expression of strong, opinionated speaking voices. Example 5.13 is taken from SC-SCI.

Example 5.13

如果利用公布成績與排名來強迫學生念書，排定個人能力的高下，忽略學生個人的興趣與他所專長的才能，我認爲是十分不合理的。(SC-SCI).

(BT) If forcing students to study by making public their scores and ranks, ranking individual performances, ignoring students' individual interests and talents, I consider [it] extremely unreasonable.

In this example, the writer expresses his point of view about education. The first person singular reference is collocated with *renwei* (meaning *to think* or *consider*) and an adverb of degree *extremely* is used to modify his comments. *Renwei* collocates frequently with 1PS in SC-SCI (47 instances), but there is only one such collocation in SA-NTC and zero in SA-TC. This finding conforms to our discussion in 2.5.2 and 4.2.2. that implicit self-references are preferred in Chinese but they are made explicit when the writers want to make a marked effect, for example to highlight their personal point of view, as in this example. Therefore, the low frequency of 1PS in SC-SCI reflects the preference of implicit self-reference in the Chinese norm, and the high frequency of collocation with the strong opinionated expression shows that 1PS is often used for markedness.

In SA-NTC, 1PS is used more frequently than in SC-SCI, and one of the reasons may be related to "redundant" uses - meaning 1PS which are understood from the context and whose presence is not obligatory. In the discussion of the Chinese reference system, Huang (1994:208) points out that when a reference is clearly understood from the context, such as in a topic chain, the zero reference is preferred. In SA-NTC, as well as in SA-TC[76], 1PS are often used explicitly even when they are understood from the context.

Example 5.14

記得 1998 年春天剛從美國回到台灣時，我做的第一件事就是把個人電腦連接上網。上網以後，我便開始閱讀在國外習慣瀏覽的一些網站，包括《紐約時報》（nytimes.com），美國有線電視新聞網（cnn.com）和美國線上（aol.com），有如進入到一個無邊無際的世界裡。我常常會忘了身在台灣，瞬間彷如人仍在紐

[76] See example 4.18 in 4.2.2.1.

約。因爲我看到的、讀到的和通訊來往的，都還是那麼熟悉的景物。剎那間，我直覺想到了「天涯若比鄰」這句話，或許該說成「天涯@比鄰」吧。(Liu, January 2002).

(BT) Remembering that after coming back from the USA to Taiwan in the spring in 1988, the first thing I did was to connect my PC to the Internet. After connecting to the Internet, I started to browse some websites that were often read abroad, including New York Times (nytimes.com), CNN (cnn.com) and American Online (aol.com), as if entering a borderless world. I often forgot being in Taiwan, suddenly as if still being in New York. Because what I saw, read, and communicated, were all those familiar things. Suddenly, I instinctively thought of the idiom "the end of the world is as if at neighbour", or should say "the end of the world @ neighbour."

Example 5.14 from SA-NTC is similar to the discussion of example 4.18 from SA-TC, in which several instances of *wo* are actually optional and can be understood from the context. Unless otherwise specified, it is assumed that the subject *wo* carries out all the actions in this topic chain. However, if the first person reference is repetitively used, a different pragmatic effect is generated, such as the salient presence of the writer. This repetitive use of 1PS in a topic chain occurs less frequently in SC-SCI and is the feature shared by SA-NTC and SA-TC.

Besides all the similarities pointed out above, the SA-NTC, however, displays a feature of self-reference that is not seen in the translated corpus. It is found in SA-NTC that some writers use a third-person pronoun to refer to themselves, as in example 5.15.

Example 5.15

至於受催眠者能否在催眠狀態下展現自由意志的問題，筆者的意見是「可以」以及「不可以」。(Chen, June 2004).

(BT) As to the question of whether a hypnotized person can perform of [his / her] own free will in a hypnotized situation, the writer's view is yes and no.

"*The writer*" (*bizhe*) as a self-reference is a strategy commonly used in Chinese in formal register, such as news editorials, to minimize the presence of an individual

voice. In SA-TC there is no instance of such uses, but in SA-NTC there are eight instances. In SC-SCI, there are six instances, so this formal expression does not seem to be of frequent use in other Chinese science writings either. The eight instances of *bizhe* in SA-NTC are found in six articles written by three writers in SA-NTC, so this may be related to the style of the individual writers. Therefore, the finding of this formal register use of self-reference suggests that in SA-NTC the writer-reader relationship is not consistent throughout the corpus. Some writers adopt a more formal tenor than others, which may be a habit carried over from their previous writing experiences in other genres.

In conclusion, in this section it is found that SA-NTC shares most of the functions of the personal reference in the translated corpus that are identified in the discussion in 4.2.2. Both SA corpora use 1PP frequently as the strategy to include the readers, 2P to address the readers directly, and 1PS to present the writers explicitly as the narrators. These interactive functions of personal references, although also identified, tend to appear with a lower frequency in SC-SCI. Besides, in SC-SCI, these personal references sometimes even show a tendency to exclude the readers - for example with the use of exclusive 1PP, and to use 1PS markedly to highlight the writer's opinionated voice. Therefore, the qualitative analysis also shows potential evidence of convergence between SA-NTC and SA-TC. Nevertheless, some different patterns in the use of personal references can still be found between the two SA corpora. For example, the use of third personal reference rather than first personal reference by some writers in SA-NTC suggests that some Chinese writers still adopt a formal relationship with the readers, which is less often seen in the translated corpus. Overall, despite some minor differences between the two SA corpora, SA-NTC displays more similarity with SA-TC than with SC-SCI in this qualitative analysis, and further supports the influence of translation practice on the non-translations.

5.2.3 Junction

The findings in the quantitative analysis (5.1.3) show that SA-NTC uses a similar frequency of junctives as SA-TC does, and the frequency is much higher than the SC-SCI. This apparent accommodation to SA-TC can be regarded as potential evidence that SA-NTC is influenced by translation practice in terms of the representative

junctives investigated in the corpora. Therefore, a higher frequency of explicit junctives does not only exist as a unique feature of translated texts but is also observed in the non-translations. Compared with SC-SCI, the explicit junctives in the two SA Chinese corpora are especially salient in the representative additive and adversative junctives. This suggests that, in the Chinese reference corpus, additive and adversative junctions are largely achieved without explicit junctives, whereas in the SA-TC and SA-NTC additive and adversative junctives are added. The following two examples show this contrast. Both examples are extracts of descriptive texts, and they demonstrate two different cohesive strategies to link or show contrast of various aspects of the topic in discussion. Example 5.16 is from SA-NTC and example 5.17 from SC-SCI.

Example 5.16

[1]在 ISS 影像中，也可以看出彎曲的河道構造。[2]而有些呈筆直延伸的大尺度暗線，可能是如斷層般的地質現象。[3]此外還有幾個隕石坑般的構造，雖然大氣可以阻擋隕石撞擊，但以土衛六形成的歷史看來，在地表上看到的隕石坑數量還是太少，可見它曾經歷過風蝕、河水侵蝕搬運或火山等地質作用而使地貌重塑。[4]在極區與赤道區，地貌則有明顯的差異，可能是季節變換下日積月累的結果。例如，在高緯度地區，河流較寬、較深且長，可能是因爲極區降雨較多的關係（南極上空有較多的雲層）。(Qiu, April 2005)

(BT) [1] In the ISS image, [one] can also see a curved river structure. [2] And some large-scale straight extended dark lines may be a geological phenomenon such as a fault. [3] In addition, there are several structures, like a meteor crater, although the air can resist being hit by meteors, but judging from the history of the formation of the Titan, the number of meteor craters is still too small, [and one] can see that it has experienced geological processes such as wind erosion, river erosion and transportation, or volcano and cause land reclamation. [4] In the pole area and the equator, the landform *ze* has more obvious differences, which may be cumulating effects from season change. For example, in a high latitude area, the river is wider, deeper and longer, probably because the pole area has more rain (the South pole has more clouds above the sky).

This example is from SA-NTC. The writer presents four aspects of the Titan: the river structure, the fault, the meteor crater, and the geological features in the pole and equator area. The description starts with the structure of the river - a continuous flow from the previous proposition indicated by *ye* (also). Then the focus moves to the geological movement of the fault, and here the additive junctive *er* is used. The following sentence begins with *ciwai* (in addition), which signals that another aspect of Titan's appearance is to be expected. The fourth sentence then moves on to the pole and equator areas but here the flow of information is suggested to be discontinuous, as indicated by the adversative junctive adverb *ze*. This aspect shows some inconsistent features from the previous three aspects. The last sentence offers a possible explanation for the fourth aspect, and the connection is provided by the exemplifying junctive *for example*. The structure of this passage is bound together mainly by explicit junctives. Although lexical cohesion (such as all the geological terms) helps to maintain a link between sentences, in terms of the larger structure and progress of the information, it is explicit junctives that guide the readers.

Example 5.17 is a description of Venus. The length of this paragraph is similar to that of example 5.16 and the writer also presents four aspects. But cohesion in this passage is achieved differently from the previous example.

Example 5.17

[1]金星的地形起伏不定，處處可見熔岩流過的痕跡和隕石衝擊的坑洞；由此可見，金星和地球一樣，也有地殼變動的現象。[2]灼熱的金星內部，仍然具有可以使地殼隆起或下沈的力量；這種板塊運動的巨大力量，會將大地撕扯出一道道的裂痕。[3]金星表面有２０５個峽谷和帶狀地帶，最長可達６８７０公里喔！但科學家認爲它不是由水和冰河形成的，而是由溫度高而黏度低的熔岩，大量流動所造成的結果。[4]馬克斯威爾山是金星的最高峰，從它起伏不定的外形，科學家相信金星可能和地球一樣，曾經發生過陸地板塊下沈的運動。(SC-SCI).

(BT) [1] Venus's terrain is undulating; everywhere [one] can see the traces of lava and holes hit by meteors; from this [one] can see, Venus is similar to the Earth, [and] also has the phenomenon of crust change. [2] Venus's hot interior, still possesses power that can make crust rise or fall; this kind of great power of plate movement will

tear off the surface into traces of cracks. [3] Venus' surface has 205 gorges and strips; the longest [one] reaches 6870 kilometres! But the scientist does not think it is formed by water and glaciers, rather than the result of lava with high temperature and low adhesiveness, which flows in a large quantity. [4] Mountain Maxwell is the highest mountain on Venus; from its undulating appearance, scientists believe that Venus is like the Earth, and has experienced the movement of continental plate sinking.

In example 5.17, the four aspects are connected without any explicit junctives; the only two junctives are used for explanation within the third aspect. The writer simply presents four aspects in parataxis without connecting them with additive junctives such as *er* or *ciwai* used in example 5.16 The junctive relation here is maintained through a continuous theme progression. According to Daneš (1974), the significance of theme is not only a departure point of a single sentence but an important device to maintain cohesion in a text. He (ibid.:114) defines thematic progression as:

> the choice and ordering of utterance themes, their mutual concatenation and hierarchy, as well as their relationship to the hyperthemes of the superior text units (such as paragraph, chapter, ...), to the whole text, and to the situation.

Therefore, a writer's choice of the theme in each sentence is largely related to the overall structure and rhetorical purposes of a text. Example 5.17 illustrates a constant (continuous) thematic structure.

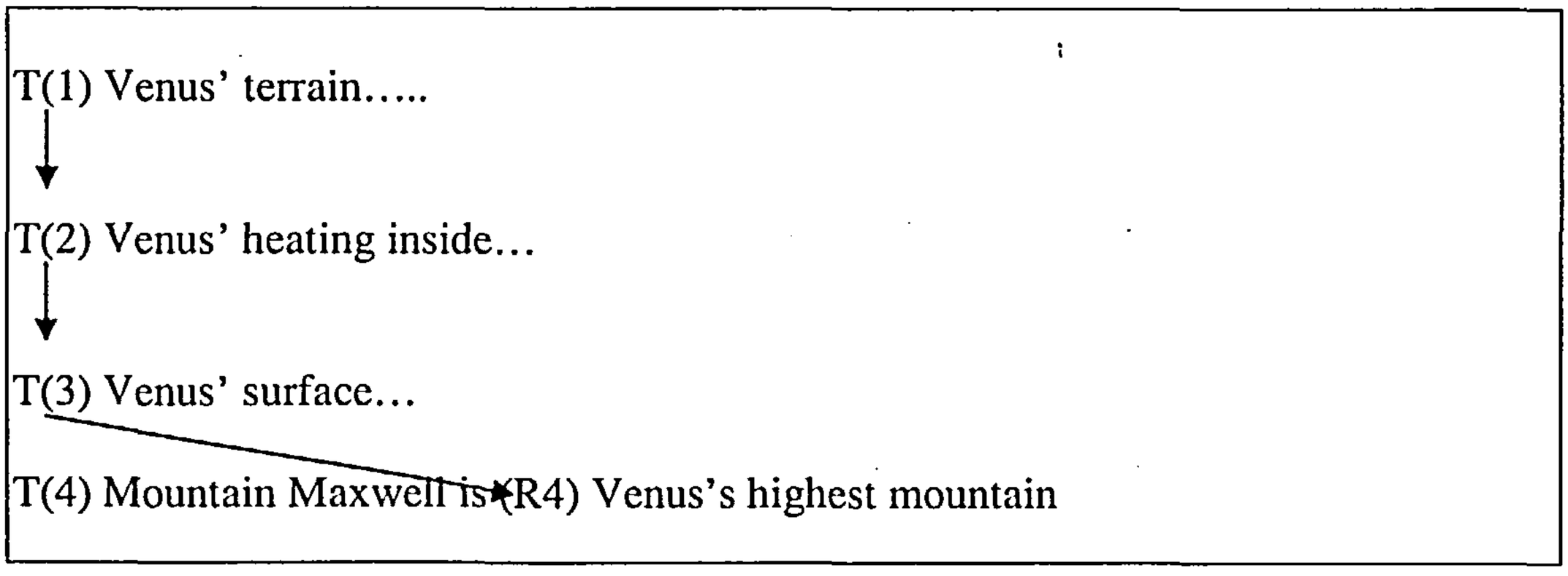

Figure 5.1 Thematic progression of example 5.17

The thematic progression as shown in figure 5.1 is: T(1) = T(2) = T(3) = R(4). The readers can process the first sentences without much difficulty, but the fourth sentence may cause some uncertainty as to whether it is still about the same topic or not. Without the junctive as an explicit signal, the achievement of cohesion relies on other resources such as lexical cohesion or theme-rheme pattern at a higher textual level.

Through the comparison of the two - example 5.16 represents a common trend in SA-TC and SA-NTC and example 5.17 as the norm in Chinese, - we can see how writers in the SA corpora rely largely on junctives to construct the texts and to interact with the readers. In SA-TC and SA-NTC the readers obtain more assistance from the text producers with more explicit signals in the process of reading, whereas in SC-SCI the readers have to draw more co-textual (such as the macro-level structure in example 5.17) and contextual evidence.

To relate the finding to the wider aim of this project - writer/reader interaction, - it seems that the writers of SA-NTC adopt a similar strategy to that of the translators in using junctives and thus facilitating the reading process. We do not have cognitive evidence as to which ways Chinese readers prefer. However, if we accept that deployment of junctives can be regarded as an indicator of the writer's intervention in the text and control over the readers, then we may suggest that the writers of SA corpora generally have stronger involvement in the texts than the writers in SC-SCI corpus.

Among the six categories of junctives investigated here, the largest discrepancy between the SA corpora and the reference corpus lies in the adversative junction. Comparing the representative adversative junctives we investigated in the corpora, SA-TC has 0.56%, SA-NTC has 0.48%, but SC-SCI has only 0.21%. One reason could be that there are fewer adversative junctive relations in SC-SCI and therefore there are fewer instances of adversative junctives. It has been found that academic science writings have a comparatively lower frequency of *but* than other genres (Smith and Frawley 1983:353), and the reason suggested was that science generally has a more "sequential argument structure." Therefore, one possible explanation for the low frequency of representative adversative junctives is that the writings in SC-

SCI share more similar features with academic science writings and therefore have more sequential argument structure, whereas the SA corpora, as the genre of popular science, are characterized by the use of more junctives to interact with the readers (Myers 1991:5). However, whether an adversative junctive relationship exists in the text or not does not necessarily depend on the relationships between the propositions only, but also depends on the subjective intervention from the writers. In the literature review, we suggested that junctives are often used by the text producers to exert their control over the readers (e.g. Beaugrande and Dressler 1981:74; Mauranen 1993:168), and in the discussion of translation shifts in 4.2.3 we also see examples of junctives added in the translation, largely depending on the translator's own interpretation rather than a clear junctive relation indicated in the source text. Therefore, the relatively low frequency of adversative junctives in SC-SCI indicates that the writers rarely intervene to interpret the contradiction in the texts for the readers, but simply present contradictory propositions in parataxis to the readers. The following is an example from SC-SCI:

Example 5.18

隕石落下時常伴如大砲的音響，發出閃光而落下；有時沒有光，也沒有聲音而突然落在人家屋頂。(SC-SCI).

(BT) A meteor often falls with the sound as if bombing, gives light and falls; sometimes with no light, also no sound and suddenly falls on someone's roof.

In the first clause the writer asserts that the meteors may fall with light and sound, but after the semicolon the writer continues to say that the meteors may also fall without light and sound. Here two contradictory facts are presented to the readers and the adversative junctive relations are left for the readers to infer. Judging from a generally low frequency of junctives in SC-SCI, the implicit junction as demonstrated in this example may be a more common strategy in SC-SCI than in the SA corpora. Compared with the more active and involved attitude of the SA writers, the writers in SC-SCI are more detached from the text and the readers.

The frequency of junctives in SA-NTC in particular outnumbers those in SC-SCI in the categories of additive and adversative, which may be related to the fact that these

are the two most frequent junctive relations in the corpora. The other categories of junction, however, all have statistically significant higher frequency in SA-NTC than in SC-SCI. Nevertheless, probably because causative and hypothetical junctives often require more reasoning and judgement (Segal *et al.* 1991:50) and are more difficult to leave out in the texts without influencing the linking of propositions, they are also required to be made explicit in SC-SCI. As for the two representative temporal junctives, their frequencies are low in all the three categories so the discrepancy is not as salient as in the additive and adversative groups.

As discussed in 2.5.3 and 4.2.3, junctive explicitation is widely considered as a universal feature in translated texts (e.g. Blum-Kulka 1986/2000). The analysis in this section suggests that junctive explicitation does not happen only in the translation but explicit uses of junctives also characterize SA-NTC. Therefore, we need to explore the relation of the findings here to our overarching aim of the influence of translation practice on non-translations in terms of writer-reader interaction. Some Chinese scholars have also noticed the trend of increasing explicit junctives in non-translated Chinese, and conclude that it is a negative influence from translations. Tsai (1995:243), for instance, regards "connected speech" - meaning texts marked by explicit junctives - as a feature of "Europeanized structure" in Chinese. He criticized this influence along with other Europeanized features such as excessive use of nouns, articles, and passive voice, which can make Chinese "cumbersome, cacophonous and sometimes ugly" (ibid.:248). However, this view simply takes the texts as a product and overlooks the communicative motivation of the writers. In this analysis, we may suggest that, because the writers in SA-NTC share the same interest to interact with the readers as that of the translators in SA-TC, they therefore demonstrate similar patterns with regard to the use of junctives as interactive features. On the other hand, the writers in SC-SCI use junctives less frequently, because they may, by comparison, have a less strong interactiveness. Therefore, the influence from English may not be a passive penetration from translations to non-translations, but an active adaptation taken by the writers in SA-NTC because they want to achieve the same interactive purpose as the translators in SA-TC.

In conclusion, section 5.2.3 shows a similar trend of explicit use of junctives in SA-NTC to that in SA-TC, which is regarded as a departure from the Chinese norm. The differences between the SA corpora and SC-SCI are especially obvious in the additive and adversative groups, the two groups with the highest frequency, but the other four groups also show a similar trend of using more explicit junctives. We relate the findings to the explanation that the writers in SA-NTC and SA-TC both share a stronger tendency to interact with the readers and therefore they use more explicit junctives. The writers in SC-SCI are generally found to be more detached from the texts and simply present the propositions without explicit junctives, and the readers are left to work out the junctive relations by themselves, whereas the writers in SA-NTC, as the translators in SA-TC, are more involved in guiding propositional linking for the readers and are more authoritative in interpreting the junctive relations.

5.2.4 Hedges

The quantitative findings in 5.1.4 show that the frequency of the selected hedges used in SA-TC (0.45%) is very much closer to that in SA-NTC (0.37%), whereas the frequency in SC-SCI (0.09%) is much lower. This quantitative finding shows that the patterns of hedges distinguish the two SA corpora from the Chinese norm and suggest the potential influence of the translation practice on SA-NTC.

This section sets out to examine how the explicit uses of hedges are related to the different writer-reader interactive strategies used by the SA writers and the other Chinese science writers. The focus will not only be on the discussion of individual occasions on which the writer should use hedges or not, but rather on the writers' overall choices to present contents that are less hedged or more hedged. The selection of more established science discovery (thus less hedged) and more controversial information (thus more hedged) is interwoven with the purpose of the writing (text type) and the attitudes towards science (discourse). In other words, hedges as a distinct generic feature in the genre of popular science must be discussed with the judgement made in relation to the other two semiotic categories: text type and discourse[77].

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[77] The relationship of the three semiotic features is explained by Hatim and Mason (1990) and is discussed in 2.3.2 .

The following are two examples of science exposition: one a less hedged extract from the SC-SCI (example 5.19), and one a more hedged extract from the SA-NTC (example 5.20).

Example 5.19

爲什麼不用怪手發掘遺址，不是更快嗎？考古學家之所以能夠重建古代人類的歷史文化，除了憑藉從遺址中出土的各種遺物和遺跡之外，更重要的是遺物和遺跡彼此在時間、空間上的關係。古物在地層裡，不只牽連到年代和上下地層的關係，還有物與物彼此之間水平的空間位置關係。所以，每一件小東西，包括它出土的空間位置，都可能是日後解釋遺址最主要的證據。考古發掘人員要有規律的一層層往下挖，小心的注意遺物的出土位置，不厭其繁的拍照、繪圖記錄，就是爲了保存古物在地層中完好的空間位置，好讓後來研究者能做正確仔細的解釋。又如通常在遺址出土最多的是破碎陶片，一般人常不瞭解爲什麼要留這麼多陶片，帶回去能幹什麼？實際上，古代人類生活用品中，以陶器佔最多，所以遺址中幾乎到處都是陶器破片。(SC-SCI).

(BT) Why not use a machine to excavate a historical site, isn't it faster? The reason that archaeologists can re-establish the history and culture of ancient humans, besides basing on all kinds of unearthed relics and traces, more importantly is the temporal and spatial relationship existing between relics and traces. Relics underground are not only related to the time and the relative location with the ground, but also to the relative horizontal position with other relics. Therefore, every little object, including the location where it is unearthed, all may be the most important evidence for future explanation of the site. Archaeologists need to excavate layer by a layer in an order, pay careful attention to the location of the relics, always keep pictures and records, in order to preserve the most complete spatial record of the relics in the layer, enabling future researchers to make correct and comprehensive interpretation. Also, most unearthed relics are broken ceramic pieces; the general public often do not understand the reason to keep these many ceramic pieces, what's the use to bring them back? In fact, the daily commodities used by the ancient people are mostly made of ceramics, so the historical sites have ceramics almost everywhere.

This example is taken from the website of a digital archaeology museum and the passage is an answer from the question and answer section. In this extract, several questions are used, suggesting that the writer is anticipating questions from the readers. Questions are often regarded as an important reader-oriented interactive strategy (Hoey 1983:27). In the answers the writer uses only a few hedges so the answers are presented with full certainty without hesitation. Only three hedges are found in this example, but on a larger scale they do not seem to tone down the writer's confidence. Moreover, the use of boosters such as *In fact* highlights further the writer's confidence towards the claim he made.

Example 5.20 below is a different presentation of science discovery.

Example 5.20

若我們針對六起規模大於 6.0 的餘震做觀察，似乎它們大都發生於庫侖應力增加之區域，而同年 10 月 22 日兩起規模大於 6.0 的嘉義地震，其震源位置亦發生於庫侖應力增加的區域（如圖中深度 18 公里之圖示）。

有趣的是，這些大餘震及 10 月的兩起嘉義地震，大都發生於應力轉移增加及減少的邊界。若與主震發生時斷層面的錯動量分佈比較，此六起大餘震發生的位置，在主震發生時並無明顯錯動，暗示此區域在主震時並無釋放任何能量。因此，此六起大型餘震的發生可能暗示，其本身的應力累積在主震發生時已達某臨界狀態，而主震發生後所轉移而來的應力，誘發了這些大餘震。

此現象似乎暗示：大型餘震的位置可能是可預測的。(Ma, September 2003.)

(BT) If we focus on the six incidences of aftershocks beyond the scale of 6.0 and make investigation, it seems that they mostly happen in the area where Coulomb stress increases, and the other two earthquakes which took place in Jiayi on October 22 in the same year, also have their centre at the area where Coulomb stress increases (as indicated in the picture in the depth of 18 km.)

What is interesting is that these big aftershocks and the two Jiayi earthquakes in October, mostly happened at the edge where the shifts of stress increases and

decreases. If compared with the locations of fault slips at the fault plane when the major earthquake happened, the location where these six major aftershocks took place, has no obvious fault slips from when the major earthquake happened, suggesting that this area did not release any energy in the major earthquake. Therefore, the happening of these six big aftershocks may suggest that that accumulation of stress had reached the limit when the major earthquake happened, and the stress transformed after the major earthquake caused these big aftershocks.

This phenomenon seems to suggest: the location of big aftershocks may be predictable.

This example is clearly different from the first extract in that the writer is presenting a process of science finding rather than discovery. Therefore, it is not surprising that more hedges are used. A variety of hedges are found in this extract, including modal verbs, adverbs and verbs. These hedges function to assist the writer to "make the strongest claim possible while limiting the damage of being wrong" (Hyland 1998:176). The writer clearly signals to the readers that the claims made here are just hypotheses without solid evidence. Hedges are used as a negative politeness strategy (Brown and Levinson 1987, see 2.2.5) that protects the writers from potential challenge from the readers.

The different degrees of expression of certainty between the two examples are clearly related to their subjects; furthermore, the choice of contents to be presented to the public readers of science embeds the writer's attitude towards and interaction with the readers. The discussion below is not on the writer's choices of hedges, but on the writer's choices of more hedged or less hedged science discourse.

The less hedged content in SC-SCI suggests that the traditional Chinese writers tend to present to the public established science theory or confirmed scientific discovery, and the more hedged texts in SA-NTC and SA-TC show that the writers often present controversial and hypothetical scientific findings to the public. The two different selections of subjects can have different reader-writer interactive effects. Martin (1985: 46-47) relates the expression of certainty and necessity to the writer's attitude towards

the readers: when little hedging is used, the status quo is presented as a given fact to the writers, who are supposed to accept the fact rather than think or challenge the fact. By contrast, when hedges are explicitly expressed, they tend to stir readers' responses and make the readers challenge the status quo. Hedges can be regarded as signals of the writer's invitation to the readers to participate in the process of science making - to challenge the writer's unconfirmed claims. In the SA corpora, a higher frequency of hedges is found and more unconfirmed scientific information is presented, and therefore the readers are more often invited to think and feel with the writers, to become involved in the process of a confirmation or argumentation of a new scientific finding. On the other hand, the writers in SC-SCI tend to feed the writers with unchallengeable conclusions so there are fewer signals for the readers' participation.

The two different writer-reader interactive strategies reflect different rhetorical purposes of popular science writing. We see that in example 5.19 the writer presents himself as an authority, and educates the writers with "correct" information. For example, we note that the writer uses the reference *general public* as an imagined questioner and thus distinguishes himself - a scientific expert - from the general readers who are less knowledgeable. The purpose of this writing is to give the correct answer to the readers. The writer in example 5.20, however, is not giving an answer but is rather sharing findings with the readers. The writer expresses her hesitation and uncertainty in front of the readers. A comparison of the rhetorical purpose of these two examples presents an interesting analogy to the study of English popular science and textbooks. Parkinson and Adendorff (2004:388) compare these two science genres targeting the lay readers and find that:

> ...textbooks [function] to summarise all knowledge that is currently endorsed as fact by the research community, while popular texts function as narratives of research, reporting on new knowledge claims not yet endorsed as fact by the research community.

In textbooks, the writers are authoritative, presenting established facts, and the texts function to educate, whereas in popular science, the writers are scientists presenting "science in the making" (ibid.:393) and the texts function to inform and entertain.

Therefore, although the two genres have the same scientist-layman configuration, they reflect different scientist-layman interaction.

If we take this discussion of the function of science writing as a distinction between popular science and textbooks, it can be found that example 5.20 conforms more to the English definition of the genre of popular science, whereas example 5.19, with the function to endorse established fact, resembles the discourse of science textbooks[78]. The different function of writing sought by the writers in SA-NTC is likely to be an influence of English popular science writings via translation practice. Under the influence of the subjects chosen and the function of texts intended in the English *Scientific American*, the writers of SA-NTC also aim at a similar presentation of science in the making, use more hedges, and thus the readers are invited to participate and challenge their writings.

In conclusion, in the qualitative finding, a higher frequency of hedges in SA-NTC and SA-TC than in SC-SCI is found to relate to the text type and the writer's interaction with the readers. In the SA corpora, more hedges are used because the writers tend to share unconfirmed findings with the readers and the readers are more often involved in the process of thinking and challenging the information presented. In the SC-SCI, fewer hedges are used because the texts presented tend to be established findings endorsed by the science community. The readers are guided to accept the information rather than challenge it. The finding shows that the writers in SC-SCI interact with lay readers by sharing the process of science in the making, which is rarely seen in traditional Chinese science writings. This can be another indication of the influence of translation practice on the non-translated writings and of the SA-NTC writers' awareness of different needs and requirements of their readership.

5.3 Textual Analysis: Degree of Influence

Chapter 5 contains a comparison of the interactive strategies in SA-NTC and SA-TC, with the aim of exploring potential evidence of the translation practice on the non-

[78] Although Parkinson and Andendorff (2004) discuss English science textbooks, Chinese science textbooks seem to perform the same function to present knowledge endorsed by the research community. Therefore, it is suggested here that the writers in SC-SCI may copy the way that Chinese science textbooks are presented because they tend to present uncontroversial facts.

translations. In 5.1, the frequencies of selected features show a general picture of interaction in the three Chinese comparable corpora. Section 5.2 explores the uses of interactive features in texts and any potential evidence of translation as a shaping force. However, as pointed out in 4.3, interactive strategies display their unique features from text to text. The factors influencing the pattern of interaction may be related to sub-genres, text-types, and the kind of relationship the text producers intend to establish with the readers. This is also the case for the texts in SA-NTC. The frequency of interactive features and their functions vary from text to text. Similarly, the degree of influence from the translation practice also varies from writer to writer. It is not surprising to find in SA-NTC that some writers systematically use a higher frequency of interactive features in their writings than others.

To account for the different interactive patterns in the texts in SA-NTC, there seem to be two main factors correlating with the features of interaction and their potential influence from SA-TC. The first has to do with the rhetorical purpose of the texts. Just as there are different genres in SA-E, the texts in SA-NTC also serve different purposes and occasions. The non-translated Chinese articles are included in the magazine for two purposes: to report the development of science and technology in the Chinese science community, or to introduce scientific knowledge to a wider science community from a Chinese point of view. The latter texts are often written as an introductory or supportive reading for a translation on similar topics in the same issue. The writers could be journalists with a science background or scientists working as academics. The journalists report developments mainly in the Chinese community, and the science experts can either report their research or introduce the latest developments in their fields in the world. The professional role of the writers and their purpose of writing can both influence interaction in the texts.

The frequency of the selected interactive features investigated in the present study is also found to be correlated with the translators' background and experience in popular science writing. Some writers, such as the chief editor and the honorary editor, have their articles published in every issue; some writers are also editors or translators of the magazine; and others are scientists who are invited to share their research every once in a while. We found in SA-NTC a tendency whereby the articles written by

editors use more interactive features, whereas the invited writers generally have less obvious interaction with the readers. This may be related to the fact that the in-house staff are more familiar with the genre of popular science (especially related to their exposure to the English source texts and the translations). They may be more used to writing for lay audiences, and they are more aware that readers of popular science have different needs and requirements from readers of hard science. Nevertheless, the different interactive strategies among these writers may also be related to the fact that the in-house staff and the invited scientists tend to produce articles in different sub-genres. For example, the chief editor's article is often informal, as if chatting with the readers; the articles of other in-house editors and journalists are often news reports; and those of the invited scientists are often more formal and related to their scientific expertise. When different sub-genres are produced, it is inevitable that different interactive strategies will be found in the texts.

In the following section we are going to present two case studies that demonstrate how interactive strategies and their potential influence from translations vary according to the subgenres and the background of the writers.

5.3.1 Case Study 1: 星際論戰，但看石雕 (Argument over Stars is Resolved by a Sculpture)

This article is an argument about a new discovery in astronomy. In the first paragraph, the writer tells a story in first person narration about himself in a cold winter in New York. When he reads the New York Times, he finds an interesting report about a statue of Farnese Atlas and the secret of astronomy hidden in it. The news report suggests that the globe held by Farnese Atlas may feature an engraving of the observations of star clusters two thousand years ago. Then the writer starts searching the internet for more information and he finds two scholars debating the issue. One scholar suggests that the picture of star clusters is based on *Star Catalog* written by the first Greek astronomer Hipparchus. Another scholar suggests that Ptolemy's *Almagest* should be the blueprint of that globe. Finally, the writer compares the picture of the globe held by Farnese, the *Star Catalog* and the *Almagest*, and he concludes that Hipparchus obviously had the right answer.

The writer of this article is Zheng Zhilang, the honorary editor of Chinese SA and a neurologist with a high reputation in Taiwan. He regularly writes a column named *Chinese Perspective* (華人觀點) for Chinese SA, and the article is always placed as the first article in the magazine. The topics may not always be within his expertise (such as in this case study). The purpose is to present some scientific discovery which he has found interesting and would like to share with the Taiwanese readers. The tenor is often informal and relaxed.

In the following section we will investigate how interactive linguistic resources are used in this article. Only extracts will be presented in this section, but the full text is available on the Chinese SA website[79].

Example 5.21 is the first paragraph in this text. The writer begins the article with his personal story before introducing the issue to be discussed.

Example 5.21

街頭攝氏零下八度，除了開會非得頂著刺骨寒風外出，大半時間我只能躲在旅館房間內，望著窗外越飄越多的雪花，正前方紐約中央公園裡那一棵棵大小不一的樹，像是穿上白色大衣的雪人，安安靜靜站立，聆聽寒風的咆哮。我轉頭聚精會神凝視橫躺桌上一早送來的《紐約時報》，心裡一陣興奮，科學版刊登了一則新聞，那是 1 月中旬美國天文學會的科學家在聖地牙哥開年會時，公認爲近年來最令人喜悅與讚賞的大發現。人人津津樂道，報上也由許多資深科學記者撰文廣爲討論，我雖然不是天文學的研究者，也不能不被這些報導吸引。我迫不及待透過無線網路下載更多的報導，更大而清晰的亞特拉斯雕像（Farnese Atlas）的圖片，把它的身世看個究竟。難道那是雕刻在隕石上的作品，或隱藏了什麼密碼，才會引起天文學界的驚豔？(Zheng, February 2005)

(BT) The outdoor temperature was only eight degree Celsius minus. [I] wouldn't go out in freezing wind unless to attend a conference. For the rest of time, I usually hid in the hotel and watched more and more snowflakes falling outside the window. Those trees in various sizes in the Central Park in the front were like snowmen in white clothes, who stood quietly and listen to the growling wind. I turned my head and

[79] http://140.119.115.32/sa/read.asp?docsn=2005022199&readtype=ch (Last accessed on 31st October 2007).

focused on the New York Times that was delivered this morning and laid on the table. [I] felt excited about a piece of news in the science section. That was the most exciting and praised discovery widely recognized during the annual conference of American Astronomy Association in Santiago in January. The public discussed it with enthusiasm and many senior journalists also reported it with wide debates. Although I am not an astronomer, [I] could not help being attracted by these reports. I couldn't wait to search for more reports on the internet and clearer pictures of the statue of Farnese Atlas, and to explore the background thoroughly. Is that the picture engraved on the statue or some hidden secret which makes the astronomical academics excited?

First, the passage is characterized by the first person narration with *wo*, the reference to the writer. The writer's presence is salient in the text, so the readers interact with a personal voice rather than an impersonal narration. The frequent use of deictics is another characteristic in this article. In the category of deixis, the text has 14 proximals and 11 distals. Compared with the average percentage of deixis in SA-NTC (0.96%), this text has a higher percentage of deictics (2.7%). Indeed, the alternate use of distals and proximals in this text plays an important role in specifying relative spatial and temporal space in relation to the writer and readers. In this passage, for example, we found that distals tend to refer to physical distance - scenes in New York and events that happened in the past. On the other hand, proximals tend to function endophorically, referring to the topic being discussed in the utterances, such as *this* report or *this* discovery. In this passage, because the focus is on the writer's travel experience and the topic of argumentation has not been brought into discussion yet, more distals are used. As the writer starts to discuss the topics, proximals begin to appear more frequently than distals, as shown in example 5.22.

Example 5.22

這個發現很有趣。以現代天文物理學的精準計算，是可以根據這個星群的方位與座標，推算出它們出現了這些相對位置時的年代。薛佛教授的貢獻就在這裡。因爲這些精準的年代推測，連帶解決了雕刻亞特拉斯雕像的大師是根據誰的星球目錄才能刻出這天體之球…(Zheng, February 2005)

(BT) This discovery is interesting. The precise calculation of modern astrophysics can allow the position of orientation and coordination of start clusters in the past in

relation to these of today to be speculated and calculated. Professor Shatter's contribution is here. Because these precise calculations of time, it is also possible to calculate on which star catalogue the engraver of Farnese Atlas made this globe...

The text is a mixture of narration and explanation. The mixture of text types can also be a strategy to attract the readers - by using the narration of travel experience as a bait to hook the readers, and then more difficult science knowledge can be discussed. When the focus turns to the explanation of science, as from example 5.21 to example 5.22, it can be found that the writer's explicit involvement diminishes, and the function of deixis shifts from physical orientation to textual coherence. Proximal demonstratives are used as cohesive devices to link phrases and propositions, and spatial adverbs such as *here* are also used textually to refer to the proposition that is being discussed in this part of the text.

After the argument about the science discovery and when a conclusion is reached, the writer starts to relate the significance of this issue to the readers. The readers are involved towards the end of the text by the writer's assumption that they will have the same feeling as he does. Example 5.23 is a clear example appealing for the readers' participation.

Example 5.23

薛佛讓我們在幾千年後，仍能從亞特拉斯雕像中體會古人智慧的成就，你說我能不感動，能不也跟著感受到前人智慧的喜悅嗎？ (Zheng, February 2005)

(BT) Shaffer enabled us to share the achievement of ancient wisdom from Farnese Atlas even after several thousand years. How can I not be touched by and immersed in the joy of ancient wisdom, wouldn't you say so?

The categories of 1PP, 1PS and 2P are all used in this short extract. First, a 1PP *us* is referred to as the beneficiary of the discovery. The 1PP here can be replaced by *human beings* in general, so the writer starts relating the discovery and himself with the readers. Next, the writer talks about his own feeling by a reference to himself, and then he asks for the readers' agreement by asking them a question with a second

person reference. Through the use of explicit reference to the readers and a question as interactive devices, the readers are invited to participate in the text.

Finally, in the last sentence, the writer concludes the text with his personal feeling.

Example 5.24

仔細再看石雕，亞特拉斯忍辱負重的臉龐，似乎因爲千古之謎得以解開，而有了笑容？！ (Zheng, February 2005)

(BT) From another careful look at the statue, the face of Farnese Atlas who had endured much humiliation in order to achieve great achievements, seems to find a smile for the solution of the thousands-year-old secret?!

The writer's subjective involvement is clear in this sentence. The smile on the face of the statue and the face which had suffered humiliation are subjective judgements made by the writer without scientific proof. In the final sentence, the writer's tone shifts from that of a scientist exploring the truth behind the argument to that of a lay person who just appreciates the beauty of the statue. The personal attitude of the writer is characterized by the emotive adjective *renrufuzhong* (a Chinese idiom meaning people who suffer a lot in order to carry out important tasks), the use of the hedge *sihu* (*seem*), and an informal and unconventional use of punctuation *?!*, indicating both uncertainty and excitement. Furthermore, this punctuation *?!* is also directly interactive – an invitation to the reader to react to the text in a particular way.

To summarize the writer' interactive strategies, first of all; the interaction is achieved through the organization of the texts - from personal story, explanation of the science, appealing for the readers' feelings, and then personal feelings as a conclusion. The exposition and argumentation are interwoven with personal narration to make the texts more attractive to the lay readers. The interpersonal interaction is characterized by many personal references. The proximals are used mainly as anaphoric reference, and the distals help readers visualize objects in distance. Hedges and other attitudinal markers (such as punctuation) present the writer's personal feelings more explicitly in front of the readers. Finally, it should be noticed that the use of junctives is sparse in this text, and this may be related to the fact that explanation does not play a large part

here, so junctives, in particular the use of adversative and causal junctives which characterize many other scientific articles, appear less frequently in this text.

In section 5.3.2, we will look at a text with very different interactive strategies.

5.3.2 Case Study 2: 科技需要管理嗎? (Does technology need management?)

The article[80] is the first in a series of articles published in a column named *Technology, Innovation and Management*. In the non-translated Chinese section, besides the contribution of in-house staff, other experts are invited to contribute to different columns in the magazine. Usually several writers take turns writing for a column, so each of them may write only one or two articles a year. The writer of this article, for example, has only published three articles in five years. According to the editor (Zhang, M. 2006), these invited writers tend to be less certain about the kind of article that Chinese SA expects them to produce, and frequent communications and even instructions from the editors are often needed.

The topic of this article is made explicit in its Chinese title (*Does technology need management*), and the thesis is also clearly expressed in its Chinese subtitle placed below the title (*From a macro point of view, science and technology are two mechanisms that have to be compatible with each other*). The organization of the text is rigid and straightforward. The first paragraph sets up the background and functions as a thesis to be argued against. The second paragraph begins with an adversative junctive, and states the counter-thesis to be elaborated further. The following paragraphs elaborate the reasons to support the counter-thesis one by one. Finally, a conclusion is made about what this column intends to bring to the readers in the future. The text follows a standard structure of counter argumentation.

Example 5.25 is the first paragraph in this text. Let us look at how the writer introduces the article to the readers.

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[80] The full text can be referred to on the Chinese SA website http://sa.ylib.com/forum/forumshow.asp?FDocNo=638&CL=16 (Last accessed on 31st October 2007).

Example 5.25

科學研究和藝術創造一樣，都要依賴一群擁有深厚知識、嫻熟專業技能的人，日以繼夜、不眠不休地投注在工作上，才能產生卓越的作品。作品的成敗取決於研究者的原創、熱情與專注。過程中，外界的各種要求常成爲創作最大的干擾，尤其是官僚系統中的行政作業，常被視爲是抹煞創意的最大殺手：因此，科研創作和管理常被視爲是對立的兩個面向。(Wu, March 2005)

(BT) Science research is similar to art creation, both relying on a group of people with deep knowledge and skilled profession, working day and night on their products, so that they can produce excellent pieces. The success or failure of a product depends on the researchers' creativity, enthusiasm and concentration. In the process, external requirements are often the biggest disturbance; the bureaucratic administration, in particular, is often regarded as the biggest killer of creativity: therefore, science innovation and management are often regarded as two opposite aspects.

Compared with the personal involvement of the writer in the first case study, this introduction is very detached and less emotive. This extract contains no personal references to writers and readers, and no deictics giving orientation to the readers at all. In fact, this is the feature observed throughout the article. The only personal reference used in this article is a generic use of 1PP: *Theoretically, we call it an innovative system.* The only deictics used are three proximal demonstratives, two instances of *zhe* as anaphoric references, and one instance of *ben*, a formal alternative of *zhe*, referring to the present article. Three hedges *often* are used when stating why technology and management are contradictory. The hedges in these statements set up an expectation for the following arguments.

Among all the interactive features discussed in this study, the most salient one used in this article is junction. Even more salient, all of the junctives occupy the theme position in the sentence, and they function to establish a macro-structural relation rather than intra-sentential relations. We can clearly see the development of the text by looking at the first sentences of each paragraph from paragraph two.

Example 5.26

但是，從宏觀的角度審視，科技與管理卻是兩個必須共容的機能。

首先，現代的科技研究多是依靠一組團隊，而非天才型的個人。…

其次，在大多數情況下，所有科學的發明都必須轉換成和生活有直接關連的產品或服務，…

第三，科技發展和社會體制緊密相關，兩者間的聯結關係更需要有效管理。…

另外，許多科技的突破都根本改變了人類傳統的生活秩序，…

總之，在科技發展的過程中充滿了各形各色的管理議題，也正是本專欄作者群希望共同探討的。…(Wu, March 2005)

(BT)

Nevertheless, from a macro point of view, technology and science are two mechanisms that have to be compatible with each other…

First, modern technology often relies on teamwork rather than talented individuals…

Next, in most occasions, all scientific invention needs to be converted into commodities or services directly related to living…

Third, development of technology is closely connected to social system, and the connection of the two needs further effective management.

Besides, many breakthroughs in technology radically change human beings' traditional way of living…

Finally, the process of development of technology is full of all kinds of issues related to management, and they are what the authors of this (*ben*, formal register) column intend to discuss…

Most of the junctives function as cataphoric junctives pointing out temporal successivity in the logical development of the texts. In Halliday and Hasan (1976: 263), these junctives are categorized as "internal type"- what they point out is not the coherence in the events being talked about but the process of presenting them. These junctives generally involve less subjective manipulation from the writers who try to persuade the readers to accept their viewpoints, but mainly to present a sequence.

Overall, the linguistic devices in this text do not seem to show a strong tendency to interact with the readers. The writer is not explicitly presented in the text and no obvious personal attitudes or expressions are involved. The successive junctives can be regarded as a friendly consideration for the readers, but other than that, the readers are not invited to participate in any way. Compared with the first case study, this text

foregrounds the issue being discussed rather than how the participants approach the issues.

5.3.3 Discussion

The two case studies present two different interactive strategies. The writer in the first case study uses a variety of devices to interact with the readers - personal references, deixis, a story-telling introduction, a mixture of different text types, questions, and innovative uses of punctuation. By contrast, the second case study uses fewer interactive devices and the text is detached and rigidly structured.

As pointed out at the beginning, interactive strategies are related to the rhetorical purposes of the text. The first case study is more conversational because the writer is sharing an interesting scientific discovery with readers and the writer-reader interaction is like chatting with friends. By contrast, the mission of the second case study is to give the readers an introduction to technology and management from a writer who is an expert in this field. That is why the personal dimension is relatively underplayed.

Besides the rhetorical purposes, the difference may also be related to the writer's familiarity with the genre. The writer in the first case study has his own column and his article is published in every issue. He is also an active advocate of science popularization in Taiwan, and often gives public lectures on topics within his expertise to the public. On the other hand, the second writer is invited to write for the magazine less frequently and his main focus is still on his academic field. His writing may still be under influence of communication with a peer group in his academic writings.

Overall, the section demonstrates that the interactive pattern does not show consistency in SA-NTC, and its similarity or difference from the interactive pattern observed in SA-TC can be governed by complex factors. A Chinese writer using fewer interactive devices – in contrast to the trend of active writer-reader interaction observed in SA-TC - may be interpreted as receiving less influence from the translations; but other factors such as the communicative purposes of the individual

text can also be an explanation. Therefore, although in the analysis in 5.1 and 5.2 we observed a trend of the Chinese writers using interactive devices in a way similar to that of the translators, a closer investigation of individual texts shows that the writers in SA-NTC use interactive patterns in different ways according to their communicative purposes.

5.4 Conclusions

This chapter presented findings of interactive patterns in SA-NTC in comparison with those in SA-TC and SC-SCI. The purpose is to identify any potential evidence of the influence of the translation practice on the non-translations in Chinese SA.

Concerning the quantitative analysis in 5.1, it was initially observed that the frequencies of the four selected interactive features in SA-NTC are between those in SA-TC and in SC-SCI, but much closer to those in SA-TC. SA-TC and SA-NTC use the four selected features more frequently than does SC-SCI.

The contextual analysis in 5.2 showed a consistent pattern with the statistical findings that the writers in SA-NTC use deixis, personal reference, junction and hedges to interact with the readers in similar ways, which is not or rarely seen in SC-SCI. Nevertheless, there are also interactive strategies in SA-TC that have not emerged or are used much less frequently in SA-NTC.

In 5.1 and 5.2 we identified trends prevailing across the SA-NTC, and in 5.3 we conducted two case studies to show variation among the writers in SA-NTC. Although the overall trend is an accommodation to the SA-TC, the degree of influence from translation practice and the patterns of interactive features vary according to text-type and genre, and the experience of the writers in this genre. The creation of popular science as a new genre in Chinese is influenced by the translated popular science writings, and it is also influenced by the purpose of the text. The Chinese popular science writers may react against the norm of academic science writing because of an instinctive awareness of the needs and requirements of their readership.

CHAPTER SIX
INTERACTION IN THE GENRE OF POPULAR SCIENCE

This chapter is devoted to a discussion of interaction in texts and paratexts. The first part brings together the textual results found in chapters 4 and 5, so that a more comprehensive picture of the trends of interaction taking place both in translated and non-translated texts in the SA Chinese magazine can be presented. The textual findings will first be summarized, and then interpreted according to the instrumental/documentary dichotomy (Nord 1991) proposed in Chapter 2, and also the concept of mediation proposed by Hatim and Mason (1997). The discussion of interaction in the texts will then be matched against evidence of interaction in paratexts, and how the publication positions itself and its readers. This step aims to give more credibility to our interpretation of textual findings and is taken as a precaution to avoid the circularity[81] often found in discourse analysis. The profiles of the readers and writers – including the editors, writers and the translators of Chinese SA, will be examined in order to shed some light on the plausible explanations of the interaction designed in the Chinese SA magazine.

6.1 Interaction in Textual Findings

This section sets out to address the two research aims proposed in Chapter 1. Section 6.1.1 tries to assess how the translators design their interactive strategies and how the strategies differ from the source texts or the target-language norms. Section 6.1.2 endeavours to assess whether there is any potential evidence of influence of translation practice on the non-translations in terms of the use of interactive strategies.

6.1.1 Translators' Strategies

The instrumental versus documentary dichotomy (Nord 1991) is proposed as a model to interpret translators' strategies, because the distinction is made according to the function of communication in the translation process, i.e. what kind of communication the translator aims to carry out in relation to the target readers. The instrumental approach designs a new communicative interaction between the ST writer and TT

[81] See the discussion of Stubbs (1997) on independent evidence and Myers (1999) on "re-materialising" the text in 3.3.4.

readers, whereas the documentary approach seeks to reproduce the interaction between ST writer and ST reader, and TT readers are left as observers in the communication. According to this definition, it seems that the strategies adopted by the writers in SA-TC should be categorized as instrumental. Evidence from time and place deictic shifts and shifts towards inclusive first personal reference suggests that the translator does not reproduce communication between ST writers and readers, but involves the TT readers in the process of communication.

This dichotomy, however, is not very useful when we try to interpret our findings. In Nord's explanation, the effect that an instrumental approach intends to achieve is to produce the translation as an original writing, i.e. the readers are not supposed to notice that they are reading a translation (Nord 1997:50). Nevertheless, the translators in SA-TC, although they aim to involve the target readers in the process of communication, do not seem to hide the traces of the texts as a translation from the readers. For example, it is often found in the translations that English-specific cultural references are left with no explanations[82], or left in English without any attempt to adapt them to functional equivalence in Chinese[83]. In such instances, the reader "plays the part of an observer listening to the conversation of two strange parties" (Nord 1997:50), which is Nord's description of a documentary translation.

These problems suggest that when a study like the present one focuses on the interactive dimension in the translations only, it is difficult to apply a clear-cut distinction between an instrumental and a documentary approach. To picture the interaction in SA-TC more clearly, we may imagine that the ST writers and readers and the TT translators and readers are all presented. In this scenario, the ST writer talks to ST readers, and the translators stand beside the TT readers. Both the translators and TT readers are observers in the communication. In some moments, the target readers listen to the stories that take place in foreign places, time and among foreign people without the intervention from the translators. However, sometimes

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[82] One example is "fraternity" (in the case study in 4.3.1), translated as 兄弟會 (literally as *brother club*). The translation either assumes that the readers can understand this term and therefore no further explanations are needed; or the term is not so important that it requires clear explanations and the direct translation can also add an exotic flavour of the source culture.

[83] One example is the argument over the pronunciation of "Klu Klux Klan" (in example 4.22 in 4.2.2.4), in which the term is presented as English in the translation.

when the translators anticipate that the TT readers may have difficulty understanding what ST writers say to ST readers, the translators offer their explanations from their understanding to the TT readers. At these moments, the spotlight shifts from the communication between ST writers and readers to the translators and TT readers, and this is when the deictic and personal shifts, explicit junctives, and hedges indicating the translators' intervention emerge. In other words, it is difficult to say whether the translators create a new communication with target readers, but the translators' interventions are clear. Perhaps a better way to account for the translator's strategies is to describe them in terms of the degree of mediation (Hatim and Mason 1997).

Following Beaugrande and Dressler (1981), Hatim and Mason (1997:147) define mediation as a continuum, explained as the extent to which the translators are involved in "feeding their own knowledge and beliefs into their processing of a text". The degree of mediation does not necessarily correspond to the communicative interaction that a translation intends. The translators' intervention can be observed in a literal translation or a domesticated translation. The degree of mediation provides a convenient framework to describe the translator's interactive strategies when only the interactive dimension is focused on, as in the present study, and the aim of communication is mixed.

At the two extremes of the scale of mediation are minimal, which relays the genre and discourse value intact from the source text, and maximal mediation, which constitutes a radical departure from the source text. The translators' mediation in SA-TC in general should be categorized as partial intervention - the translator's interference is only as much as is "compatible with easy intelligibility" (ibid.:161). Unlike the more heavily mediated translations, which may present a radical departure from the discourse or genre of the source texts, the effect resulting from partial mediation tends to be changes in distance between text participants. This is similar to what we found in SA-TC: the translators' intervention in texts is clear, but the shifts result only in a difference in the interactive dimension rather than producing any radical changes.

To summarize the findings, the translators' presence is clear in the translations, but they conduct only partial mediation. The target readers can recognize the texts as a

translation from the notes and explanations supplied by the translators and other paratextual features, and they can recognize the interventions of the translators as mediators in the texts. Therefore, the source text writers, the translators, and the target readers interact in the translations, and the translators stand closer to the target readers than the source text writers.

6.1.2 Influence from Translation Practice

Here we would like to bring the translator's strategies and the convergence of SA-TC and SA-NTC into the discussion against the framework of polysystem theory (Even-Zohar 1978/2000), as discussed in 2.4.1. We have pointed out that this theory, which is based on literary translation, has been applied to studies of non-literary translations, and the development of popular science writings in Taiwan today seems to fulfil one of the criteria: that the translation has the potential to occupy the central position in the polysystem. Because popular science writing is young in Taiwan, translations are becoming an important resource to develop this genre in Taiwan.

In the textual findings in Chapter 4, we found that the pattern of selected interactive features in the translation departs from the patterns observed in the reference corpus. This finding seems to conform to the theory that, when the translations function to create new and primary models, the translators' main concerns will not be to follow the TT conventions, but they would be more influenced by the ST and ready to make violations of the target norms (ibid.:196). The convergence of frequencies and functions in the use of interactive features in SA-TC and SA-NTC also suggests that the SA-TC plays a dominant role in the system, and the new models created in the translations seem to gain ground in the target system.

Although the textual findings seem to support the hypothesis that translation practice has potential influence on the non-translations, we should be cautious about jumping to a simplistic conclusion. In a similar study examining the performance of translation practice and the target norms (House 2006 and others, see 2.4.2), the translations and the non-translations are also found to display convergence in their frequencies of interactive features. Two explanations proposed by House (2006:38-39) may be applicable to the interpretations of our findings:

Model 1: the translational process **effects** changes

Model 2: the translational process **reflects** changes

Of course, one possibility is that the communicative dimension in the target language has undergone changes in recent years (maybe the result of changes in society in general), so the translations simply reflect these changes. However, the present study has as its starting point an investigation of the potential influence of translation practice on non-translations. The most important fact that supports our research question and interpretation is the Chinese SA publisher's statement, as already cited in 2.1.2, that one of the reasons for introducing this magazine in Taiwan is to provide a canon that other Chinese popular science writers can follow. Furthermore, one of the reasons they include Chinese writers' articles in the magazine is to encourage Chinese writers to enrich this genre in Taiwan. The texual findings in chapter 5 suggested that the writers of SA-NTC have begun to react against the norm of Chinese science writings and used more interactive strategies in texts to interact with their target readership. Therefore, the translations are set by the publisher as a model to be imitated by the non-translations and that is why we suggest that the translations should be interpreted as the agent that effects the changes rather than reflects the changes.

Another reason to support our explanations is that in the discussion in the case study in 5.3 it has been suggested that the degree of interaction in non-translations, among other factors, seems to be related to the writer's exposure to translation practice. Comparing the two case studies in 5.3 - and admittedly more evidence is needed in order to make a general claim – we found that the stronger the Chinese writers' exposure to the translations, the more similar the pattern of interaction they display with the translations. This tendency suggests that the Chinese writer's practice is strongly influenced by the translation practice, so it is more likely that the translations effect the changes rather than reflect the changes.

Therefore, to answer the second research question in the present study, it is suggested that, based on the textual evidence from the interactive features examined in the

corpus used in the present study, the translation practice in SA-TC has potential influence on the non-translations in SA-NTC.

6.2 Interaction in Paratexts

This section sets out to seek further evidence of interaction in paratexts. The paratextual evidence can not only allow us to have a fuller account of the interaction taking place in the communicative activity, but also triangulate[84] the textual findings by matching the results obtained from the textual studies in chapter four and chapter five with other evidence. Paratexts, such as prefaces, illustrations, or other reviews, are often regarded as a supportive element around the texts. However, sometimes paratextual material can pre-determine how the readers interpret the texts before they actually access the words in texts (Kovala 1996:141). For example, how the editors of Chinese SA introduce the function and the role of their publication in the preface may influence how the target readers accept the texts[85]. Furthermore, the role of paratexts is even more important for translated texts. The study of translated texts should focus not only on how paratexts accompany texts, but, more important, how they serve as "mediators between the text and the target reader" (ibid.:120). Paratexts in translation can facilitate acceptance of a translation in the target culture. In short, we would like to look for evidence of interaction in the SA Chinese magazine - the evidence of paratexts obtained from both online and paper issues - and to see whether it may manifest the trends of partially-mediated interaction found in textual evidence. In the following we shall examine prefaces, the visibility of Chinese writers and translators, and other visual presentation and layout.

6.2.1 The Publisher/Editor's Statement

The most direct way to look for the purpose of the SA Chinese publisher in launching this magazine in Taiwan is to look for their words in the preface. In the publisher's and the chief editor's introductions to this magazine on the website[86], there can be

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[84] Triangulation is an approach commonly used in the social sciences, meaning matching textual evidence against external sources, or vice versa. Matching the textual evidence against paratextual information also helps to minimize the danger of circularity in discourse analysis (see 3.3.4).

[85] As we will see later in the publisher's statement in 6.2.1, the Taiwanese publishers recommend the magazine in the U.S.A. as suitable gifts from parents for their children, and this may build up a perception that the science knowledge in this magazine is at an appropriate level for young readers.

[86] The statement quoted in this section is from an introductory section made by the publishers and editors and other scientists from the SA Chinese website http://sa.ylib.com/about/about03.asp. (Last

found emphases on interaction with Chinese readers and the link of this magazine with the development of local popular science writing. The English SA[87] boasts mainly of its "immediacy, timeliness and authority" and delivery of the latest developments in science and technology. In the Chinese SA, although the authority and immediacy of SA are stressed, its relationship with the readers is also emphasized. For example, the publisher praises the friendliness and easy readability of this magazine and claims that in the USA it is a magazine that every household must have and an appropriate present for American children at Christmas. The chief editor also expresses his vision that all science can be turned into public knowledge, and the scientists and the pubic can share the joy and the fruit of science together. The role of this Chinese edition in Taiwan is said to be to enhance the competitiveness of Taiwan in international society and to keep track with the progress of the world. What is even more important is to promote the creation of Chinese popular science writings - i.e. the emergence of a new genre in Taiwan.

How the publisher defines the role of this magazine and its achievement will have an impact on its presentation - both textually and paratextually. The textual strategy of the translators and the Chinese writers in this magazine may, either consciously or unconsciously, be influenced by and conform to the publisher's brief. In practice, according to my interview with the editor (Zhang, M. 2006) and a translator (Yao 2006), the editors do not give specific instructions to the translators and the writers as to how to interact with the readers or how to use specific interactive features. Only general instructions based on the general Chinese translation textbooks, such as correctness, fluency and good Chinese, are given. Therefore, the consistent trends of shifts and choices of interactive features made by the translators are not the result of instructions given by the editors, but more likely to be unconscious choices made by the translators, perhaps under the influence of the publisher's brief.

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accessed on 31st October 2007).

[87] See "about us" in the English website: http://www.sciam.com/page.cfm?section=history (Last accessed on 31st October 2007).

6.2.2 Visual Presentation and Layout

The paratextual presentation also shows how the Chinese edition is designed specifically for the target readers. The most obvious evidence that distinguishes the Chinese edition from the English edition is its title *Kexueren* (Scientific People), instead of *Scientific American*. Clearly, this is a consideration of different target readers[88]. The design of the title of the magazine is an interesting design. The English logo *Scientific American* is not replaced by the Chinese character *kexueren*, but is partially covered by the Chinese characters. This design, which is not seen in any other international editions (which either keep or drop the English title), suggests that the Chinese edition does not completely maintain or diminish the English source, but it is left partially visible for the Chinese readers.

The cover story chosen in the Chinese edition is often different from that of the English edition. The Taiwanese editors select the cover story based on what they think will be more attractive to the Taiwanese readers. Some articles selected as cover stories in the Chinese edition but not in the English edition are "*Why? The Neuroscience of Suicide*"(自殺!爲什麼?), "*The Early Evolution of Animals*"(貴州小春蟲改寫動物演化史) – a story about a fossil discovered in China – and "*Back to the Future of Cereals*" - translated as *Tailor-made New Rice*(量身訂做新稻米) in the Chinese edition. These topics are either closer or more relevant to the life of Taiwanese readers. Articles that are chosen as cover stories in the English edition but not in the Taiwanese edition (e.g. "*Fire by Wire*" and "*A Hologram*") tend to be more scientifically specialized, compared with the preferred cover stories in the Chinese edition.

The order of the articles in the magazine also differs. The most obvious reason to adjust the order is because articles from Chinese writers need to be included. These Chinese articles are often placed beside the translated articles on the related topic, as assistance to the target readers to become familiar with the development of a

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[88] Not all the international editions make such change in the title. Among the 19 editions, many, such as the Dutch, Romanian and Greek versions, still keep the title *Scientific American* in the translated edition. It would be interesting to find out whether the unchanged title indicates less intervention from the local publishers, i.e. whether they present only what *Scientific American* says in English but do not localize the translations.

particular topic from a local point of view. Other reasons for adjusting the order of articles in the Chinese edition are also related to the degree of interest for the Taiwanese readers, which may differ from that of the English readers. The Chinese edition always begins with the Chinese chief editor's words and a column called *Chinese Perspective* written by the honorary editor.

6.2.3 The Translators' and Writers' Visibility

The presence of the text producers in written texts can be regarded as a signal of the writer's interaction with the readers. In the textual analysis, we regard first person references, hedges and other attitudinal markers as indicators of the writer's involvement in the texts. In fact, the writer's presence can be most clearly shown by an introduction of their names and other information in paratexts.

In the study of paratexts, it is found that the writers' names are often foregrounded as part of the general publicity machinery (Kovala 1996:137). In the English SA, it is found that the writers' titles - such as Nobel prizes winners, government officials, etc. - are stressed to enhance the authoritativeness of the magazine. In the magazine, the writers' backgrounds are often presented in a box placed beside the main text. A similar trend of using the translators' backgrounds as publicity machinery is also found in the Chinese edition. In other words, the translator's "visibility" (Venuti 1995) is a feature in the SA translations. The translator's name is always given below the ST writer's name (except in news reports and other small columns). At the end of the article, the translator's background is also given. Although not as comprehensive as the introduction to the source text writers, the translator's scientific expertise, which may include their educational background, current science-related positions, or any other publications in the related fields, is always highlighted. The presentation of the translators with their scientific expertise seems to endorse their role as mediators between the source text writers and the target readers, and to entrust the target readers with the interventions from the translators. The translators' backgrounds are important in a partial-mediated translation because they do not only pass words from the ST writer to the target readers, but they actively mediate and participate in an interaction with the target readers.

6.3 Motivation of Interaction

As stated in 2.2.1, interaction comprises two parts: the writer's position in texts and the readers' response to texts. This section tries to explore the magazine's readership and the text producers' conceptions of readership, and also the role and responsibility perceived by the text producers, with the hope of shedding more light on the trends of interaction observed in texts and paratexts.

6.3.1 Considerations for Target Readers

An important difference that has been referred to in the textual analysis is that the translators may show more consideration and assistance for the target readers because of the different levels of science literacy between ST and TT readers. *Scientific American* is well-known for being targeted at the "educated layman" in its English version and most of its international editions, but how each edition defines the term varies. The Chinese edition in Taiwan explicitly defines the term as any educated person above the level of high school education[89]. However, according to the editor (Zhang, M. 2006), students make up forty percent of the subscribers, among them many high school students (16-18 years old) and even junior high school students (13-15 years old). In fact, the editor suggests that the proportion of students may even be higher because adult subscribers may subscribe to the magazines for their children. The editor acknowledges that this proportion of student readers is higher than that in America, where professional readers represent a higher percentage. Compared with the English edition and some other international editions who define the educated lay audience as people above university level, the majority of readers in Taiwan seem to be situated below the strict definition of educated lay audiences.

In fact, it seems that the publication of this magazine is intended for young students from the beginning. The Chinese SA website[90] invites several of the most influential figures in the science community in Taiwan to recommend this magazine, and most of them assume the target readers to be young students. Li Yuanzhe, the head of Academia Sinica, considers the publication of the Chinese edition as a benefit to the

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[89] The following recommendations can be found on this webpage http://sa.ylib.com/service.asp#4 (Last accessed on 31st October 2007).

[90] http://sa.ylib.com/about/about02.asp (Last accessed on 31st October 2007).

Taiwanese students. Zheng Zhilang, the deputy head of Academia Sinica and the honorary editor of Chinese SA, expresses his wishes that Taiwanese students would be touched by the words and learn that the pursuit of knowledge will make their life more meaningful. Li Guowei, a researcher in Academia Sinica, adds that the magazine is a window open to the world, which will benefit many people in Taiwan, especially the young people. Therefore, although the SA Chinese publisher ostensibly targets educated laypeople (i.e. people above high-school age), many young students are also encouraged to read this magazine.

The editors actually seem to foresee that the magazine may be too difficult to understand for some of their potential readers. In a question and answer column on the website[91], it is suggested that many readers write to the publisher and complain that the content is too difficult for them. The publisher answers that this is a magazine, not a textbook, so it cannot explain everything for the beginners. However, the publisher encourages the readers to keep reading even if they can understand only sixty percent of the content. The publisher also points out that various features, such as explanatory boxes beside the main texts, are used to help the target readers. The Chinese writers are also invited to write articles in fields similar to those of the English articles in the issue to help the readers. The awareness of the different education level of the ST and the TT readers may motivate the editors and the translators to offer more assistance, which may unconsciously account for their use of interactive features. In fact, the editor (Zhang, M. 2006), a translator (Yao 2006), and a Chinese writer (Zhang, J. 2006) - although far from being representative of the whole team - all express their personal feelings that the content of the English edition is difficult for the Taiwanese readers. The evidence of the different education level of the ST and TT readers, and the implication of the text producers' concerns for the readers' difficulty, may have some impact on the more frequent use of interactive features and therefore a stronger interactive dimension in the SA-TC and SA-NTC.

6.3.2 The Role of Text Producers (Chinese Editors, Translators, and Writers)

We now turn to how the text producers in Chinese SA - including editors, translators and writers - view their roles in the interaction with target readers. The summary of

[91] http://sa.ylib.com/service.asp#4 (Last accessed on 31st October 2007).

the textual analysis in 6.1 concludes that the interactive strategies adopted by the translators are characterized by their strong involvement in texts to assist the target readers. They not only pass information to the Taiwanese readers, but also introduce and explain the source texts to the target readers. From the analysis of selected interactive features in Chapter 5, it is found that the non-translations also display a similar pattern. The text producers' strategies can be accounted for by their conception of the readers, as discussed in the previous section, and they can also be explained by the text producers' perceptions of their roles in the interaction with the readers.

From the interview and other comments and reviews, it is found that the text producers of SA have a sense of responsibility for the promotion of science popularization in Taiwan. The editors, translators, and writers - who all have solid science backgrounds - regard themselves as mediators between the more advanced science development and Taiwanese society, where science knowledge is still considered as not sufficiently popularized. In the interview with one translator (Yao 2006) and one Chinese writer (Zhang, J. 2006), they both talk about their responsibility as science scholars to introduce more accessible science knowledge to their readers. Other writers for SA have published their views on the role of scientists in science popularization. Pan (2001), a renowned popular science writer and translator for Chinese SA, stresses that the academics have a social responsibility to the public. He advocates that science scholars, if unable to translate a book themselves, should at least fulfil their social responsibility by recommending to the Taiwanese publishers foreign science writings that are worth translating. On media, the public's views on popular science also tend to emphasize their contribution to Taiwan's science education and the people's scientific literacy. The social responsibility perceived by the text producers themselves and imposed on them by society, may be a motivation for their active participation in the process of interaction with the target readers. They have higher aims than simply translating the texts or producing a text; rather, they aim to enhance the science literacy of Taiwanese readers.

6.4 Conclusions

In this chapter, we have discussed the trends of interaction observed in textual analysis, and explored further paratextual evidence and plausible motivations that manifest and explain the textual findings. In SA-TC, the translators show partial mediation in the interaction between source text writers and target readers. The translators, with more scientific background than the target readers, not only convey the information to the readers but also assist in the readers' process of reading. In SA-NTC, the influence from translation practice is found throughout the analysis of the four selected interactive features. The translations are found to play a dominant role in the popular science system in the target polysystem.

The trend of interaction in SA-TC and SA-NTC is put forward in paratextual information, including the publisher's statements, the visual design of the magazines, and the visibility of names and backgrounds of the translators and the Chinese writers. Interaction in paratexts shows that the Chinese SA endeavours to assist the readers and highlight the Chinese translators' and writers' role in the process of communication, which is coherent with the textual findings.

The possible motivation for the trends of interaction has been explored, based on the two aspects of interaction proposed in 2.2.1. Section 6.3 takes into account the factors related with the consideration for the readers and the role of text producers. Information gathered from interviews and other documents suggests that the mediation by the translators and active participation by the Chinese writers may be related to the fact that Chinese readers tend to be younger than the English readers, and the Chinese scientists are given the social responsibility to promote difficult scientific knowledge to the public.

Finally, at the end of the analysis, it is important to point out that the study aims to explore salient trends of interaction in the translations and non-translations in Chinese SA, but the study does not claim to cover **every** aspect of interaction in texts. Similarly, the discussion of motivations behind the interactive strategies is suggested as involving some of the factors among many other factors - such as gender, individual style, translation training received - that may influence the text producers'

choices. Interaction in texts can be achieved through a complicated network of linguistic resources, and the pattern of interaction observed in texts can be motivated by a variety of reasons. The present study, although it focuses on selected interactive features and textual examples only, endeavours to point out some of the features that distinguish the texts in Chinese SA from traditional science writings in Taiwan, and shows that the Chinese SA may display unique features of its own and start to shape a new genre in Taiwan.

CHAPTER SEVEN
CONCLUSIONS

7.1 Evaluation of the Study

The aims of this study have been to investigate the interactive strategies adopted by the translators and the potential influence of the translation practice on the non-translations. To attain the aims, a theoretical framework has been established, drawn mainly from the fields of textlinguistics, pragmatics, discourse analysis, target-oriented translation theories and cultural-historical approaches in translation studies. The study is conducted by means of a corpus-based methodology. Three corpora based on the Chinese and English editions of the magazine *Scientific American* are compiled specifically for the investigation of interaction in the genre of popular science, SA-E, SA-TC, and SA-NTC, and a reference corpus SC-SCI is also included. Deixis, personal reference, junction, and hedges are used as the main indicators of interaction taking place in the texts. The analysis is conducted first quantitatively and then qualitatively. Although the main focus in this study is textual analysis, evidence from paratexts is also examined in order to support further our textual findings. After a brief summary of this study, we will evaluate its contribution and limitations.

7.1.1 Original Contribution

This study follows the view of written texts as an interaction and draws on a field of related theories to establish a theoretical framework. Although a considerable amount of research has been conducted in this field, our reviews suggest that very little (see, however, Thompson and Thetela 1995 and Myers 1999) has been attempted to investigate how all the aspects of interaction interweave and how different views of the act of communication can provide explanations for the interactive phenomena observed in texts. The present study established a model for investigation of interaction in written texts by bringing together all the relevant aspects in textlinguistics, pragmatics and discourse analysis, and demonstrates how these theories can function together to investigate interaction at different levels.

Another intention of this study is to adopt a corpus-based methodology to investigate interaction. The study of writer-reader interaction has favoured mostly qualitative

analysis, probably because it is difficult to analyse patterns of interaction in a large quantity of texts. The present study, however, based on a suggested model of corpus-based study of pragmatics and discourse (such as that of Munday 2002) demonstrates that a corpus-based quantitative analysis can be integrated with a qualitative analysis in the study of interaction. The corpus methodology has the advantage of identifying trends of recurrent patterns, whereby human analysis can then be involved to investigate more specific examples in texts.

In terms of the genre of popular science in Taiwan, to the best of our knowledge, this study is the first comprehensive study of its writer-reader interaction and the relation between translated and non-translated popular science writings. This study extends the discussion of the language of popular science to the fields of pragmatics and discourse, and therefore it presents a clearer picture of how popular science, as a genre, contains a process of interaction between writers and readers, with complicated motivations of power and solidarity, and ideology and other social perspectives of this genre. This study has also shown the current trend of emerging non-translated Chinese popular science writings, and with the assistance of comparable corpora, shows linguistic evidence that they may be influenced by translation practice.

Finally, the present study contributes to the construction of a linguistic model that can investigate interaction in Chinese texts. The study of the interactive function of language in Chinese is much less comprehensive than in English. In this study, we explored in depth the use of deixis, personal reference, junction and hedges in the Chinese texts. In the text analysis – in the case studies in 4.3 and 5.3 in particular, we showed how these features can interweave to achieve collectively an interactive purpose.

7.1.2 Limitations

Within the scope and time span of a PhD study, it is inevitable that there are limitations to the research, and the present study is no exception. This section will point out some of the limitations to which this study is subject.

First, the investigation of interaction in this study is based mainly on four selected features: deixis, personal reference, junction, and hedges. Although in the contextualized analysis we tried to bring other relevant features into discussion - such as transitivity, direct and indirect speech, and presuppositions – the trends of interaction identified in the quantitative analysis are based on the four features metioned above. The reasons for selecting these four features and the systematic process of selections were explained in Chapter 3, and these four features have proved to be very useful in our model of investigation. However, needless to say, interaction in written texts can be achieved through a number of devices, not limited to these four only. Even though the investigations of the four selected features all demonstrate a consistent pattern of interaction in SA-TC and SA-NTC, i.e an active interaction with the readers, we cannot rule out the possibility that other interactive features may show a different type of interaction.

The second limitation concerns limited evidence from paratext. Paratexts such as màterials surrounding the texts and interviews with the text participants are brought into the study in order to confirm further our textual findings. Nevertheless, compared with the proportion of textual investigations, the proportion of study devoted to paratext is relatively small. In particular, the interviews involve only one editor, one translator and one Chinese writer - although we did try to obtain the views of other text producers from their published articles. The relatively small amount of paratextual evidence can certainly not reconstitute the context in which the process of interaction is taking place, although the limited amount of paratext evidence seems to be consistent with our textual findings.

The third limitation concerns the rather basic skills of corpus processing. The corpora involved in this research are only minimally manipulated. The English and Chinese texts are aligned, and the Chinese texts are segmented. The only data retrieved from the corpora are word frequencies and display of concordances. Only minimal tags are edited in the corpus manually, such as the <break> and <merge> tags which indicate sentences that are broken or merged in the translations. Owing to the limitation of time, the corpora are not edited with more detailed tags such as part-of-speech, so it is not possible to retrieve other useful statistics that may also reflect the writers' choices,

such as lexical density and type-token ratio. The rather basic corpus skills may limit the extent to which this study can benefit from the corpus-based methodology.

7.2 Indications for Further Research

Concerning the study in the same field, investigating more interactive features and applying more advanced computerized techniques can be suggestions for further research. We have pointed out in the limitation of the study that the four selected interactive features do not encompass every aspect of interaction taking place in the genre of popular science, and the investigation of other linguistic devices may show different patterns of interaction. Also, this study focuses mainly on quantifiable interactive features - mostly words and phrases - but it would be interesting to look at how interaction may be achieved through macro-level structures, such as text-structure, texture, etc., and how the main topics are developed through the texts. In the study of parallel texts, it may be found that the translators do not have much choice when making changes in the macro-structure, but it would be interesting to investigate the comparable corpora and see how the emerging trend of popular science writings in Taiwan has changed macro-level textual structures in comparison with the traditional Chinese popular science writings for the public.

Also, in this study we have noticed that studies of interaction in Chinese written texts are scarce, and there are various ways in which the model of interaction proposed in the present study can be applied to other genres, such as business communication, advertisements, etc. The list of interactive features in the present study is based on the repertoire of related studies, mainly in English, but as more studies are devoted to the phenomena of interaction in written texts, one may find that there are some linguistic features that are used specifically for interaction in Chinese written texts, or a similar linguistic feature may have a different interactive function in Chinese and English texts.

Another interesting field in the present study which can be studied further is the influence of translation practice on non-translations in the genre of popular science. The present study focuses only on the magazine *Scientific American*, and more evidence would be needed if one were to make a more confident claim on the

influence of translated popular science. For example, a further investigation of publications of popular science books or other translated popular science magazines in Taiwan can all be means of supporting - or challenging - our findings concerning the influence of translations.

APPENDICES

APPENDIX A

Works Included in SA-E, SA-TC, and SA-NTC

SA-E	Date	Writer
Best-Kept Secrets	Jan-05	Gary Stix
The Case of the Pilfered Planet	Dec-04	William Sheehan, Nicholas Kollerstrom and Craig B.
Controlling Hurricanes	Oct-04	Ross N. Hoffman
Gadget Envy	Oct-04	Mark Alpert
Terror Bull	Sep-04	Steve Mirsky
Mustangs, Monists and Meaning	Sep-04	Michael Shermer
Crippled but Not Crashed	Aug-04	Mike Corder
Gene Doping	Jul-04	H. Lee Sweeney
The Mystery of the Voynich Manuscript	Jul-04	Gordon Rugg
Baby Talk Beginners	Jul-04	Kate Wong
The Stem Cell Challenge	Jun-04	Robert Lanza and Nadia Rosenthal
Lessons from the Wolf	Jun-04	Jim Robbins
Death by Theory	Jun-04	Michael Shermer
The Myth of the Beginning of Time	May-04	Gabriele Veneziano
A Confederacy of Smarts	May-04	Gary Stix
The First Nanochips	Apr-04	G. Dan Hutcheson
Fly Me to the Moon	Apr-04	Mark Alpert
Draining the Language Out Of Color	Apr-04	Philip E. Ross
Plug-and-Play Robots	Apr-04	W. Wayt Gibbs
The Spirit of Exploration	Mar-04	George Musser
A Strategy of Containment	Mar-04	Christine Soares
Better Displays with Organic Films	Feb-04	Gary Stix
Four Keys to Cosmology	Feb-04	George Musser
Ballot Breakdown	Feb-04	Wendy M. Grossman
It's High, It's Far	Feb-04	Steve Mirsky
Why Machines Should Fear?	Jan-04	W. Wayt Gibbs
A Great Echelon of Birds	Jan-04	Marguerite Holloway
Does Race Exist?	Dec-03	Michael J. Bamshad and Steve E. Olson
Circles for Space	Dec-03	Madhusree Mukerjee
Breath Takers	Dec-03	Gary Stix

The Cells That Rule the Seas	Dec-03	Steve Nadis
Science for Cops	Dec-03	Mark Alpert
Light Sails to Orbit	Nov-03	Philip Yam
A Bridge Too Far	Nov-03	Steve Mirsky
Waiting for Liftoff	Nov-03	W. Wayt Gibbs
Ultimate Self-Improvement	Sep-03	Gary Stix
Friable Flowers	Sep-03	Marguerite Holloway
Questioning the Delphic Oracle	Aug-03	John R. Hale, Jelle Zeilinga de Boer, Jeffrey P. Chanton and Henry A. Spiller
Keeper of the Objects	Aug-03	Steve Nadis
Converging on the Couch	Aug-03	W. Wayt Gibbs
You Can Patent That?	Jul-03	Gary Stix
Self-Repairing Computers	Jun-03	Armando Fox
Wired Superstrings	May-03	Gary Stix
Working Weeds	Apr-03	Kathryn Brown
Screen Writing	Apr-03	Mark Alpert
The Relentless Storm	Mar-03	Gary Stix
Follies and Foucault's Pendulum	Mar-03	Marguerite Holloway
Why? The Neuroscience of Suicide	Feb-03	Carol Ezzell
Sheer Lunacy	Feb-03	Steve Mirsky
Back to the Moon	Jan-03	Mark Alpert
Throwing Einstein for a Loop	Dec-02	Amanda Gefter
Controlling Robots with the Mind	Oct-02	Miguel A. L. Nicolelis and John K. Chapin
Adding Sugar to Bioscience	Oct-02	Mike May
Real Time	Sep-02	Gary Stix
How to Build a Time Machine	Sep-02	Paul Davies
A Promenade with Prosimians	Sep-02	Marguerite Holloway
Human-free Kick	Sep-02	Dennis Normile
Soft Manufacturing	Aug-02	Gary Stix
Machine Chic	Aug-02	Mark Alpert
Who's Who	Jul-02	Paul Wallich
Thinking Big	Jun-02	Gary Stix
Whatever You Say	Jun-02	W. Wayt Gibbs
Journey to the Farthest Planet	May-02	S. Alan Stern
Wireless Data Blaster	May-02	David G. Leeper
The Ultimate Clean Fuel	May-02	Julie Wakefield

Tress of Triassic	May-02	Marguerite Holloway

SA-TC	**Date**	**Translator**
量子傳訊，絕對機密	Feb-05	張明哲
誰偷了海王星	Jan-05	王道還
掌控颶風	Nov-04	蔡雅鈴
令人豔羨的小東西	Nov-04	吳鴻
反恐吹牛王	Oct-04	鍾樹人
福特野馬，一元論者，生命的意義	Oct-04	姚若潔
搖搖不墜	Sep-04	鍾樹人
基因療法讓你壯	Aug-04	涂可欣
密碼？騙局？	Aug-04	甘錫安
從「兒語」開始	Aug-04	王道還
幹細胞的挑戰	Jul-04	涂可欣
狼來了	Jul-04	姚若潔
理論殺人	Jul-04	姚若潔
時間有沒有起點？	Jun-04	林世昀
微軟的天才大軍	Jun-04	鍾樹人
第一代奈米晶片	May-04	蔡雅芝
帶我去月球	May-04	郭兆林
看語言的顏色	May-04	王道還
隨插即用機器人	May-04	鍾樹人
探索的精神	Apr-04	傅宗玫
圍堵傳染病的操盤手	Apr-04	涂可欣
捲起來帶著走的顯示器	Mar-04	張明哲
解開宇宙命運之謎的四把鑰匙	Mar-04	李沃龍； 曾玠郡
電子投票箱	Mar-04	黃青嵐
飛得又高又遠	Mar-04	甘錫安
機器人也該有恐懼感？	Feb-04	鍾樹人
候鳥大軍漫天過境	Feb-04	王心瑩
區分人種，有意義嗎？	Jan-04	王道還
麥田上又見大圓圈!	Jan-04	曾玠郡
呼吸檢測器	Jan-04	潘震澤
統御海洋的小傢伙	Jan-04	涂可欣
科學辦案	Jan-04	鍾樹人
漫遊太空的帆船	Dec-03	李沃龍
長橋誌異	Dec-03	鍾樹人

等待升空	Dec-03	郭兆林
終極自我改良	Oct-03	姚若潔
巧奪天工的玻璃花	Oct-03	李千毅
地質訴說的古老神喻	Sep-03	姚若潔
天體守門員	Sep-03	甘錫安
統統到沙發集合	Sep-03	鍾樹人
連這也可申請專利？	Aug-03	鮑家慶
永不當機的電腦	Jul-03	鍾樹人
串連的物理學社群	Jun-03	鍾樹人
商機勃勃的小野草	May-03	李千毅
真正的「筆記本」電腦	May-03	吳鴻
風暴中的貝爾實驗室	Apr-03	鍾樹人
奇想建築與傅柯擺	Apr-03	甘錫安
自殺--他們爲什麼要這樣做？	Mar-03	潘震澤
謬人謬論	Mar-03	詹紅
何時重返月球？	Feb-03	王季蘭
如果愛因斯坦與她相遇	Feb-03	甘錫安
以意念操控機器	Dec-02	潘震澤
給生物科技加點醣	Dec-02	潘震澤
問，時間爲何物	Nov-02	王道還
如何建造時光機	Nov-02	陳義裕
漫步猿猴群中	Nov-02	姚若潔
機器人世界杯足球賽	Nov-02	吳鴻
用橡膠製作超微型晶片	Oct-02	陳義裕
穿上電腦趕時髦	Oct-02	吳鴻
誰是誰	Aug-02	江坤山
立志作大事	Aug-02	潘震澤
你說了就算	Aug-02	吳鴻
航向最遠的行星	Jul-02	高涌泉
寬頻無限傳輸	Jul-02	江坤山
超淨燃料	Jul-02	儲三陽
三疊紀之樹	Jul-02	王道還

SA-NTC	**Date**	**Writer**
人類的創造力 從何而來？ [Where does human creativity come from?]	Nov-05	洪蘭
原創力之探源，猶如摸象？！ [The origin of creativity is a myth]	Nov-05	曾志朗

閱讀，讓你的腦更有創造力！ [Reading makes your brain more creative]	Nov-05	洪蘭
歷史上最偉大的學生 [The greatest student in the history]	Oct-05	曾志朗
水稻基因組完成定序 [Rice genome has been sequenced]	Sep-05	龐中培
總編輯的話——不斷補充的牙齒 [Chief editor’ s column: Ceaselessly growing teeth]	Sep-05	李家維
老楊的音樂箱 [Old Mr. Yang’ s music box]	Aug-05	曾志朗
學會了很好，忘了也不賴！ [It’ s good to learn, and also to forget]	Jul-05	曾志朗
總編輯的話——千面人和黑心油麵 [Chief editor’ s column: Man of a thousand faces and ill-made noodles]	Jul-05	李家維
台灣高中生競逐國際少年科學桂冠 [Taiwanese high school students compete in the International Youth Science Forum]	Jun-05	郭靜琪
民主光環背後的科學 [Science behind the glory of democracy]	May-05	陳文盛
光芒閃耀的物理盛宴 [A splendour feast of physics]	May-05	邱淑慧
土衛六，和地球如此相似！ [Titan is so similar to the Earth]	Apr-05	邱淑慧
用鏡頭追隨法布爾 [Following Jean-Henri Fabre with a camera]	Apr-05	郭靜琪
科技需要管理嗎？ [Does technology need management?]	Mar-05	吳思華
內容至上？ [Is content the most important in the digital world?]	Feb-05	盧希鵬
星際論戰，但看石雕 [The star war is solved by a sculpture]	Feb-05	曾志朗
專吃海洋「飄雪」的怪方蟹 [Grapsidae which only eats marine snow]	Feb-05	鄭靜琪
遠與近 油與水 記憶與遺忘 [Far and near, oil and water, memory and forgetting]	Dec-04	蔣勳
諾貝爾獎札記 [A story about Nobel Prize]	Dec-04	周成功
RFID 新標準上場 [New RFID standard is introduced]	Nov-04	翁千婷
星星火蟻，足以燎原 [Small fire ants can cause big disaster]	Nov-04	龐中培

追風的故事 [A story of chasing typhoons]	Nov-04	吳俊傑
創意公用，台灣上路 [Share creativity with the public in Taiwan]	Oct-04	翁千婷
愛因斯坦的腦子 [Einstein’ s brain]	Oct-04	王道還
不「成器」，怎琢玉？ [Archaic jade technology]	Sep-04	張孟媛
「明天過後」是否雪過天晴？ [Will the day after tomorrow be a sunny day?]	Jul-04	陳明德
小春蟲，是人類的祖先嗎？ [Is Vernanimalcula guizhouena our ancestor?]	Jul-04	龐中培
後搜尋引擎的殺手級應用 [Smart application of search engine]	Jul-04	張俊盛
武威山茶再綻異彩 [Camellia buisanensis Sasaki reappears]	Jun-04	龐中培
重訪佛洛伊德 [Revisit Floyd]	Jun-04	王浩威
催眠面面觀 [Aspects of hypnogenesis]	Jun-04	陳一平
喬治米勒在聖塔菲 [George Miller in Santa Fe]	May-04	張俊盛
仰觀宇宙之大，俯察品類之盛 [Admire variety in the huge universe]	Apr-04	李家維
我的螢幕能彎曲 [My screen can bend]	Apr-04	翁千婷
意外的訪客 [An unexpected visitor]	Apr-04	宋宜真
該換腦袋了吧！ [Should we change a brain?]	Apr-04	盧希鵬
寧爲探險，不顧科學？ [In favour of exploration than science]	Apr-04	郭兆林
呼叫清道夫 [Call street sweeper]	Mar-04	張孟媛
奈米科技的關鍵材料 [Key materials of nanotechnology]	Mar-04	劉仲明
需求爲發明之母？ [Is necessity the mother of invention?]	Feb-04	王道還
僧侶與科學家 [Monks and scientists]	Jan-04	周成功
生物多樣的「巧笑倩兮」 [The importance of biodiversity]	Dec-03	賈福相

科技企業的近親繁殖現象 [Inbreeding of technology companies]	Nov-03	盧希鵬
墾丁秋風飛鷹揚 [Spring winds and eagles in Ken Ding]	Nov-03	王心瑩
公民如何參與科技評估？ [How do the citizens participate in evaluating science and technology?]	Oct-03	吳嘉苓
【921 四週年】剖析集集大地震 [The fourth anniversary of the 921 earthquake]	Sep-03	馬國鳳
921 震殤之後 [After the 921 earthquake]	Sep-03	蘇東平
夢醒時分：拯救稀有植物別無他法？ [Is there any other way to save rare plants?]	Sep-03	李家維
標準模型再受挑戰 [Standard models are challenged again]	Sep-03	宋宜真
年齡與科學創新 [Age and science innovation]	Aug-03	吳仲義
讀外語，學科學 [Learn foreign languages and study science]	Jul-03	王孟亮
1976 年豬流感疫苗事件 [An outbreak of swine influenza in 1976]	Jun-03	王道還
SARS 冠狀病毒基因現形！ [SARS Corona virus reveal its true features]	Jun-03	王心瑩
科學研究的前瞻與回顧 [The history and prospect of science research]	May-03	蒲慕明
隱形微中子之超級變身術 [The magic of invisible muon neutrino]	May-03	張達文
以明察暗，以大制小：尋找暗物質 [In search of dark materials]	Apr-03	方勵之
科技與社會的對話 [A dialogue between technology and society]	Apr-03	吳泉源
每季願有十日閒 [A wish to have ten days free every season]	Mar-03	王倬
編字典比文學創作有趣？ [Is dictionary coding more interesting than literature writing?]	Feb-03	吳仲義
你有生殖器支原體嗎？ [Do you also have Mycoplasma Genitalia?]	Jan-03	陳文盛
背負十字架的螃蟹 [Crabs carrying the cross]	Dec-02	黃一農
肉食恐龍也會吃素？ [Do carnivore dinosaurs also eat vegetable?]	Nov-02	張碧慧

浪跡歐洲的翰林學士 [A 19th century Chinese diplomat in Europe]	Nov-02	黃一農
獨行者楊振寧 [Noble prize winner Yang Zhen-ning]	Nov-02	江才健
外來的不一定都是客 [Outcomers are not always guests]	Oct-02	李家維
笛卡兒，我們往腦看吧！ [Descartes, let’ s look at the brain!]	Sep-02	洪蘭
世界共同的視窗 [A window shared by the world]	Aug-02	劉容生
遺傳學由簡至繁 [Genetics: from simplicity to complexity]	Jul-02	吳仲義
送藥到西非的感人故事 [Send medicines to West Africa － a touching story]	Jun-02	王正中
通通抓得住 [Catch everything]	Jun-02	胡宇光
後基因組時代？ [The post-genome era?]	May-02	陳文盛
洪流玄武岩噴發 vs.星球撞擊：到底誰是真兇？ [Which one is the cause? Burst of basalt or clash of planets?]	May-02	羅清華
中、西醫界大戰天花 [Chinese and Western medicines fight smallpox]	Apr-02	黃一農
科學，沒有顏色嗎？ [Doesn’ t science have colours?]	Mar-02	周成功
天涯@比鄰 [The world @ neighbour]	Feb-02	劉容生

APPENDIX B

List of Frequent Junctives and Hedges in SA-E and SA-TC

Rank	Junctive	Semantic category	Tokens
1	and	additive	2,682,863
2	but	adversative	454,096
3	or	alternative	370,808
4	if	hypothetical	237,089
5	when	temporal	155,417
6	because	causal	85,183
7	so	causal	64,028
8	however	adversative	57,150
9	although	adversative	43,635
10	though	adversative	28,801

Table 1. The top 10 junctives in British National Corpus (100 million words)

Rank	Junctive	Semantic Category	Tokens
1	而 er	additive	18,452
2	及 ji	additive	13,758
3	和 han	additive	13,585
4	與 yu	additive	13,445
5	但 dan	adversative	10,242
6	或 huo	alternative	8,317
7	等 deng	additive	8,070
8	因爲 yinwei	causal	7,592
9	所以 suoyi	causal	6,529
10	並 bing	additive	6,171
11	如果 ruguo	hypothetical	5,336
12	因此 yinci	causal	4,991
13	但是 danshi	adversative	4,971
14	由於 youyu	causal	4,191
15	因 yin	causal	3,476
16	雖然 suiran	adversative	3,011
17	而且 erqie	additive	2,613
18	不過 buguo	adversative	2,598
19	以及 yiji	additive	2,511
20	可是 keshi	adversative	2,487

Table 2. The top 25 junctives in Academia Sinica Corpus (5 million words)

about	97	generally	6	partly	1	show	41
admittedly	1	guess	8	perhaps	40	sometimes	15
almost	27	hypothesize	2	plausible	0	somewhat	2
appear	11	hypothetically	0	possibility	7	speculate	1
approximately	4	ideally	2	possible	28	suggest	26
argue	6	implication	3	possibly	8	suppose	5
around	4	imply	1	predict	13	suspect	5
assume	4	indicate	10	prediction	4	tend	6
assumption	1	infer	1	predominantly	0	tendency	3
basically	3	(we) know	4	presumably	0	theoretically	0
my/our belief	0	(it is) known	10	presume	0	(we) think	4
I believe	0	largely	8	probability	1	typically	5
claim	4	likely	17	probable	1	uncertain	1
could	240	mainly	3	probably	22	unclear	4
deduce	2	may	100	prose	16	unsure	0
demonstrate	10	maybe	7	questionable	1	usually	13
doubt	3	might	81	quite	16	virtually	8
essentially	4	more or less	0	relatively	16	well-known	4
estimate	12	normally	5	seem	40	would	214
expect	22	occasionally	1	seemingly	2		
frequently	3	often	31	(can be) seen	5		
general	16	partially	2	seldom	0		

Table 3. The English hedges examined in the study

(The number indicates their occurrences in SA-E)

可以	50	大概	15	大約	18
可能	147	或許	30	差不多	5
可	36	也許	42	彷彿	5
能	36	說不定	4	幾乎	17
將	29	會	108	看來	14
也許	42	約	30	似乎	13

Table 4. The Chinese hedges examined in the study

(The number indicates their occurrences in SA-TC)

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